This literature review examines what we know about community energy in the UK

Community Energy in the UK
A Review of the Research Literature

Sabine Hielscher examines the state of current knowledge about community energy in the UK, uncovering a huge diversity of projects in action.

Recent years have seen a surge in interest and activity in small-scale, sustainable energy projects led by local communities. Examples include solar water heating clubs and insulation clubs, which provide mutual support for system installation; energy awareness and behaviour networks, which provide guidance and reassurance to neighbours on energy matters relevant to them; and co-operatively-owned small-scale renewable energy systems, such as micro-hydro and wind energy.

This literature review was produced for the EPSRC-EdF research project on Community Innovation in Sustainable Energy (CISE – see www.grassrootsinnovations.org for details). The project runs from October 2010 until September 2013 and aims to understand the processes by which sustainable energy innovation operates and (perhaps) spreads in local community settings.

The literature review presented here soon makes clear how diverse is both the field of study and its analysis. There is no unequivocal definition of community energy, nor are there a clearly delineated set of theories of community energy. Whilst groups of people have been pursuing community energy initiatives for decades, it is only in recent years that this activity has been resurgent and salient in the eyes of policy and research. As such, dialogue between different research insights and the forming of an overall picture is still in its infancy.

However, the diversity, dynamics and context sensitivity of community energy suggests any comprehensive theory or picture of the field will remain elusive. Rather, what is available is a rich body of work that is of more or less relevance depending upon ones research and practical interests in community energy over time. In our case, we have related the literature to our concern for sustainable energy innovation in grassroots settings.

Community energy: a review of the research literature in the UK

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Abstract

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Introduction

This literature review was produced for the EPSRC-EdF research project on Community Innovation in Sustainable Energy (CISE – see www.grassrootsinnovations.org for details). The project runs from October 2010 until September 2013 and aims to understand the processes by which sustainable energy innovation operates and (perhaps) spreads in local community settings.

As will soon become apparent, community energy is a diverse and dynamic field of activity that is sensitive to wider energy, social and policy contexts. This diversity if reflected in the research literature reviewed here. The literature includes both peer-reviewed journal articles and grey literature, such as reports from consultants and energy agencies.

The aim with the literature review is to capture the analytical themes addressed by previous research into community energy in the UK, and to collate the lessons and insights from that research. Implications for the CISE project are drawn in places, which means an emphasis on innovation and the spread of community energy initiatives is brought to the foreground of the review on places. The review was undertaken between January and May 2011.

Past research projects on community energy: debates and themes

Community energy initiatives[1] have flourished in the UK over the past decade. There has been a stream of interest and innovative activity in community energy. Energy groups have been increasingly set up, sometimes with the aid of wider networks of shared interests. Initiatives have gained policy support and increased attention through projects such as DECC's Low Carbon Community Challenge, NESTA's Big Green Challenge and the ESRC/DECC research projects on Energy and Communities. Benefits associated with a community energy approach are claimed to include greater public participation in local regeneration and increasing local incomes, skill sets, jobs and social cohesion/ inclusion. Steward et al (2009) have identified the following elements that make community approaches distinct from other approaches and innovative: 'doing things together', 'reaching the parts others can't reach', 'increasing the visibility of personal behaviour', 'acting holistically', 'local not parochial' and 'developing and demonstrating'. In addition, a community-based approach can improve people's capacities to act through developing innovative organisational forms, legal structures and networking streams and bring about attempts to develop more systemic and locally appropriate approaches to change (Walker 2008; Capener 2009; Houghton 2010). Overall, community energy initiatives are claimed to provide opportunities

[1] Community energy groups are the people and non-human actants involved; initiatives are the energy service initiatives they undertake and activities is the work they have to do to realise each project. "The word 'initiative' is used to indicate that these are ongoing processes and are not time-limited" (Houghton 2010: 9).

for more radical transformations to the energy system and to delivering carbon emission cuts.[2] Community renewable energy initiatives[3] particularly have been linked with increasing public support for renewable energy and therefore decreasing the NIMBY opposition. Renewable energy initiatives offer communities to be financially self-sustaining, whilst enhancing people's awareness on energy issues (Walker et al 2006; Walker 2008). However, the latter two points seem to be rather debated, as the NIMBY idea has been argued to be a too simplistic concept to explain the multiple reasons for oppositional behaviour (van der Horst 2007; Krohn and Damborg 1999) and the link between local actions and global environmental concerns is not always created by community members. Local needs and aspirations, and not global environmental concerns are in some cases the predominant reason to develop community initiatives.

Although research into community energy initiatives has grown significantly, various aspects of these initiatives still seem to be "poorly understood" (Capener 2009: 3). At present the literature on community energy seems to be predominately focussed on studying community renewable energy initiatives rather than on other energy fields. Recent research projects have started to adjust this potential imbalance. In the past research studies often focused their examination on particular features of community energy initiatives and the interrelationships between government programmes, policies and local practices. Research interested in interrelationships between government programmes, policies and local practices often evaluates the claimed benefits associated with community-based approaches and identifies factors that enable and limit the development of community-led initiatives (Rogers et al 2008; Walker et al 2007; Hoffman and High-Pippert 2009; Hathway 2010; CAG Consultants 2010). More recently some research studies have started to consider the scaling up and replication of community energy approaches (Seyfang and Smith 2007; Capener 2009; Houghton 2009 and 2010; CAG Consultants 2010) to examine their potential in wider energy transitions.

The development of community energy initiatives is currently paved with challenges. The successful implementation and progression of initiatives cannot be taken for granted. Examples of initiatives exist that never got started or failed to develop and cease to exist

[2] Community projects that entered 'The Big Green Challenge' were able to reduce their carbon dioxide emissions between 10 and 32 per cent over a period of a year. When considering these reductions against UK targets of achieving an overall reduction of 34 per cent by 2020, these community projects have been able to create a considerable cut. (Houghton 2010)

[3] Community initiatives participate in numerous activities that relate to energy or more particularly to renewable energy and climate change. The literature that examines the activities of community initiatives overlaps and therefore some of the themes discussed in this report might relate to all three or just one of these areas.

(Walker et al 2007). Such challenges are regularly not linked to technological problems, as technical features are often well developed but rather relate to operational, legal or funding issues. One of the key concerns for community energy initiatives is to create a constant income stream – community ownership[4] (through assets such as community building or plant generating renewable energy). Grant funding packages can often only be a short-term fix and are complicated to coordinate, as they regularly derive from more than one funding body - each having different obligations (Houghton 2010). In particular community renewable energy initiatives are therefore keen to be less reliant on grant funding and to generate their own income through selling their surplus electricity or heat generated from renewable energy technologies.[5] Some recent changes to energy policy begin to create such opportunities. The pay-as-you-save feed-in-tariffs for renewable electricity guarantee viable returns to community groups, as may the renewable heat incentive that is currently under consultation. However, none of those general policy measures are tailored to community energy circumstances. Initiatives can become self-sustaining, develop contractual arrangements[6] and gain legal status (as registered Co-ops or Community Interest Companies) and even turn into social enterprises.[7]

> "The concept is simple, a community develops a renewable energy scheme (helping to cut carbon emissions) and make money from energy sales, that revenue is then available to fund further carbon emission reduction measures in homes, businesses and community building." (Houghton 2010: 17)

The implementation of renewable energy systems can often be a complex process because of several funding restrictions, the inaccessibility of investment capital and numerous network connection, appropriate metering and market entry difficulties (Walker 2008; Houghton 2010). Network operators currently have no real incentives to connect proactively to small-scale renewable energy generators (for a more detailed discussion see Watson et al 2006 and Hain et al 2005). Not only financial but also legal and bureaucratic

[4] Community ownership models can vary from initiative to initiative. Some community initiatives generate their own electricity and heat to supply the local community whereas others sell it to the grid. They also vary with regards to the ownership level of their assets. Some initiatives own all of their assets whereas others join co-ownership arrangements with, for example, large private sector organisations. Various legal and financial models exist: cooperatives, community charities, development trusts and shares owned by a local community organisation (Walker 2008: 4402). Community-owned renewable energy plants in the UK are, for example, ALIEnergy, South Somerset Hydro Power and Cwmni Gwynt Teg Co-operative.

[5] In addition to creating an incomes stream, community-owned assets can, for example, increase the visibility of initiatives, the reliability of energy supply and the opportunity for regeneration and the development of new jobs.

[6] Such as Green Valleys with private owners of hydro schemes

[7] In future it might be interesting to examine what impact innovations that relate to community ownership will have on the initiative, as they are likely to impact on the initiative's organisational arrangements and their capacity to act.

challenges exist. In order to determine the technical and financial feasibility[8] of a project various legal conditions[9] need to be set up (Dunning and Turner 2005) and for some projects planning permissions need to be obtained. Although the expectations exist that community-led initiatives have less problems to gain planning permission than large-scale developments, this is not always the case (Walker 2008). In addition, the involvement and support of local people can also not always be guaranteed (Walker et al 2007).

In some cases the design of programmes that are meant to support initiatives often hinder their development. These programmes that are put in place by central government and other agents such as energy companies do not seem to support the ways in which community energy initiatives actually work (Houghton 2010). The literature on community energy has outlined various recommendations on how central government could align programmes so that they help initiatives to work most effectively. Central government could also develop long-term funding support, create opportunities for initiatives to share their experiences and develop strategic learning mechanisms and visions of the future (Houghton 2010; Walker et al 2007). Other recommendations are based on, for example, improving ways to deal with the bureaucracy, increasing the possibility to connect to the wider energy system and allowing initiatives to develop their own innovative solutions.

As well as examining the interrelationship between government programmes, policies and local practices, more specifically work has been conducted to identify the various interpretations of community energy initiatives (Walker and Devine-Wright 2008) and to distinguish the various roles individuals can occupy in the sustainable energy landscape (Walker and Cass 2007). Themes that have been discussed widely in this research are participation (Hoffman and High-Pippert 2009), recruitment (Hoffman and High-Pippert 2009), social cohesion, trust (Walker et al 2010), ownership (Warren and McFadyen 2010; Woodin et al 2010; Walker 2008), responsibility (Herbert 2005), community capacity (Middlemiss et al 2010) and governance (Ison 2010) and will be outlined in more depth below.[10]

[8] The following elements are included in determining the technical and financial feasibility of initiatives: site selection, site assessment, annual energy capture measures, planning permission, choice of renewable resource, environmental impact assessment, electricity sales contract (Power Purchase Agreement), grid connection and the calculation of numerous costs: equipment, installation, running costs, maintenance, administration, etc.

[9] Community renewable energy initiatives need to, for example, become VAT registered, register as an energy generator or as an approved installer of efficiency measures, develop contractual arrangements with installers or land owners and set up insurance.

[10] Some of these themes particularly relate to the literature focused on community renewable energy initiatives.

Participation, recruitment and governance

A key characteristic that differentiates community energy initiatives from other energy approaches is the focus on participation (Hoffman and High-Pippert 2009). In some research studies participation is one of the defining feature when deciding which type of energy projects can be considered as a community-led energy initiative. For example, Hathway (2010) has argued that community energy initiatives require the involvement of local groups in the initiation and development phase. The role of a project participant, which can entail according to Walker and Cass (2007: 465 in relation to renewable energy) "membership of organising group, attending meetings or hands on installation and maintenance" is only obtainable for members of the public in a community-based approach. Public utilities, households and business energy developments are usually based on an exclusive group of people that are not accessible to the wider community. Community participation is not only what defines these initiatives it is also what keeps them alive. Investigating the numerous factors that impact on people's participation levels, Rogers et al (2008) have highlighted that in particular the placement of the project leader role is an essential part for projects to exist. Community participation is therefore a recurring theme in research projects on community energy initiatives.

For example, Walker et al (2009) have investigated the potential interrelationship between levels of community participation and degrees of social cohesion within a community through a series of case studies. A predominantly participatory approach to the initiation of community energy initiatives was often based on a strong sense of social cohesion and trust even before starting the project. Putnam (1993: 171) regards interpersonal trust as an elementary feature of civic participation and engagement, "trust lubricates cooperation and cooperation builds trust". Such feelings of trust were even more strengthened during the initiative's development phase. Walker et al (2009) concluded that whilst not the only factor, such levels of initial trust can aid the process of developing a strong participatory approach. In contrast, community energy initiatives that are based on a small group of active people can be regarded by some people in the community as being extremely exclusive and therefore increasing social divisions. Some community participation can be done in a "disempowering or tokenistic manner" (Ison 2010: 5).

Ison (2010) has argued that the acknowledgement of community participation is sometimes not enough for an initiative to be 'truly' community-led or to strengthen social cohesion. The participants' "power or influence" needs to be considered in addition to their participatory role. Ison (2010: 5) has proposed that

"… community energy projects distribute, decarbonize and democratize energy supply through community ownership and/or control, thereby maintaining the need for participation, while adding environmental and technical dimensions."

Ison (2010) has therefore pointed to the need to investigate not only issues of participation but also to consider the concept of governance. The concept allows researchers to examine in more depth the power relationships in community energy groups and how these interactions impact on the overall development of the initiative. Ison (2010: 7) has referred to Stoker (1998) and Hirst (1997) when defining governance as a political structure "that is concerned with creating the conditions for rule and collective action in accordance with established social standing". Governance includes processes of decision-making, talk and action (Barber 1984). After studying these processes within community renewable energy groups, Ison (2010) was able to at least differentiate between two governance typologies.[11] Both governance typologies allow group members some power through either voicing their consent or providing the option of leaving the initiative. However, the opportunity to influence decision-making, talk and action varies in terms of frequency and impact between the two typologies. Ison (2010) has argued that both governance models are democratic to some extent but entail "stronger and weaker acts of democracy" and higher and lower acts of participation and commitment.

Hoffman and High-Pippert (2009) regard the nourishment of community participation and the recruitment of new members as a vital requirement whenever community groups try to develop high levels of civic engagement and self-governance. Such community groups have often created a strong sense of community to gain high levels of participation, as most group members and new recruits are motivated by "an act of neighbourliness" (Hoffman and High-Pippert 2009: 3). Members are keen to participate because of the potential

[11] "The first [governance typology] is highly participatory, with a significant degree of community power; this is typically possible for smaller scale projects and requires significant commitment on behalf of a few local activists… The second model entails differentiated responsibility of different organisations at different levels of governance, less community participation and power, with an expert renewable energy company having the majority of responsibility and power." (Ison 2010: 46)

benefits to the community, an appreciation of place or a sense of duty and not predominantly because of self-interest. The initiative brings together people from different backgrounds that might experience the community work in quite different ways. Community energy initiatives therefore tend to counter, "what some argue is an era of declining civic engagement" (Hoffman and High-Pippert 2009: 6). Such community energy projects are potentially examples of Barber's (1984) participatory democracy in which community groups participate in innovative institutions of self-governance (Hoffman and High-Pippert 2009). They entail debates over concerns that are not mutually shared, developments of shared agendas and statements of common interest. Although these community initiatives exist, Hoffman and High-Pippert (2009) have recognised the amount of initiatives that practice a participatory democracy is currently small.

Responsibility and community capacity

The power relationships in communities energy groups are one of the key themes in the community energy literature. Though, the question of power is not only crucial when examining the influence of each individual group member but also when thinking about the role of community energy groups to bring about sustainable change in their wider community. Over the last decade policy makers have acknowledged an increased role for community groups to tackle climate change (see also policy section below). For example, in the HMG's (2005) report on sustainable development, community initiatives are implied to have the following potential,

"Community groups can help tackle climate change, develop community energy and transport projects, help minimise waste, improve the quality of the local environment, and promote fair trade and sustainable consumption and production."

Such an acknowledged role of community initiatives in tackling climate change could be considered as a positive development for community energy initiatives, as this recognition could lead to an increased policy support. On the other hand, as suggested by Middlemiss et al (2010), such a positive view assumes that these initiatives have the 'capacity' to change their own and other people's actions. Such a position seems to presume that initiatives want to be used as a channel for carrying out government policies and have the aspiration to change the wider social structures that surround them.

Exploring the experiences of community 'policing' groups in Seattle, Herbert (2005) has concluded that these groups often did not feel that they had a strong political role to play. Most of the time they did not even aspire to such role. The participants highlighted various obstacles to localised self-governances and considered such steps as an "off-loading of responsibility" (Herbert 2005: 851) from government to local community. This perceived 'off-loading of responsibility' often constraint community activities, as it was considered as unnecessary burden. Herbert (2005: 851) has argued that governments make use of the term 'community' and its "warm-hearted associations" as a mere rhetorical device to legitimise strategies that off-load responsibilities. This legitimisation might not only occur in relation to community policing in the US but perhaps similarly in the area of community energy. Middlemiss et al (2010) have argued that the role of communities in changing climate change seems to sometimes be treated uncritically and therefore requires further investigation. For them crucial to the notion of 'responsibility' is the exploration of the community's 'capacity for action'[12] (2010: 7560) i.e. their ability to act.

Considering that the central focus of CISE project is on innovations, we must examine how issues of responsibility, capacity, participation, governance, recruitment and trust impact on initiatives' innovation processes. For example, high levels of participation might bring in locally rooted knowledge and resourcefulness to the innovation process.[13] Risks that are often associated with innovation processes could potentially be shared amongst the community group members, allowing a greater ability for the community to act. The community might therefore not only develop innovative ideas but also develop and implement them. This might lead to an assumption that community groups that are considered as extremely exclusive undermine the ability to embed innovations. There might also be a correlation between high levels of participation, influence and trust and the community's ability to develop more radical[14] innovations. These are only assumptions that

[12] Middlemiss et al have associated the term 'capacity' with "the ability of the community in question and its members to make changes by drawing on the resources available to them individually and collectively" (2010: 7561). Community initiatives often face various challenges, for example they work with limited amount of resources (as outlined above) and therefore have various capacities to act. Middlesmiss et al (2010) have developed a theoretical framework to examine the potential ("a realistic") role of community initiatives and the limitations to their role, whilst considering current challenges for setting up community projects. The framework consists of numerous capacities i.e. cultural, organisational, infrastructural and personal that impact on the initiatives ability to act and link to their overall 'responsibility' to bring about change (see also Houghton (2010). This theme has further been discussed in the sociological literature on community (see Peters and Jackson 2008 for more detail).

[13] As a team we might need to think about whether it is what the groups do (i.e. their activities/ initiatives) that is 'innovative' or whether the groups themselves are the innovation.

[14] As a team we need to think about how we define 'radical' innovations.

we want to empirically examine. We want to examine what community energy groups consider as innovative processes and products – i.e. what is an innovation in a community context.

The literature on community energy does not only outline issues of participation, recruitment and governance but also identifies the various definitions of community energy initiatives (Walker and Devine-Wright 2008) and highlights their diversity. Their diversity is one of the key aspects of community energy initiatives and therefore needs to be considered sensibly when examining innovative activities.

Defining 'community energy initiatives' and discussing their diversity

The term 'community energy' is interpreted in different ways and used in a flexible manner by policy makers, academics, intermediaries[15] and community participants, describing numerous energy initiatives.[16] Whenever these actors try to define community energy, they put various emphases on the degree of community involvement in the initiatives, their geographical boundaries, structures of ownership and the patterns of benefit for the community. For example, Hathway (2010: 44) defines community-led energy projects as,

"Community projects involve local groups developing low carbon energy solutions appropriate to local situations and with community groups having ownership over the outcomes. Examples include solar water heating clubs, or insulation clubs, which provide mutual support for system installation, energy awareness and behaviour networks, which provide guidance and reassurance to neighbours on energy matters relevant to them; and co-operatively owned small-scale renewable energy systems such as micro-hydro and wind."

[15] Intermediaries are organisations and networks that build links between specific community energy groups, and which exist to share experience, good practice, expertise and advice. In some cases, intermediaries also act as a voice for community energy by providing evidence and advocacy to policy-makers.

[16] It is not only the term 'community energy' that is used in a flexible manner but also the term 'community' itself. There have been numerous definitions of what should be regarded as a community that have derived from the sociological literature. But the concept still represents "an elusive and somewhat intractable term with regards to its actual definition and meaning" (Peters and Jackson 2008: 5). Themes that recur in this literature are social capital, community capacity, social learning, social norms and social networks (Peters (2010); Peters and Jackson (2008), as they play a key role in characterising communities (for a more detailed discussion on the conceptions of community see for example Peters and Jackson (2008); and Baldwin (2010).

Interpretations do not only define the meaning of community energy in the numerous initiatives but also provide evidence of the diversity of community level activities. The project initiation, administration and construction can either develop out of grassroots actions, be grounded in partnerships between communities, NGOs and local government or be initiated by entrepreneurs and utilities that are willing to share some of the gains with the community.[17] These distinctions already imply different innovative organisational structures[18], legal status of initiatives[19], financial structure[20], partnerships and networking activities[21], resource bases[22], patterns of ownership[23], development models[24], business plans/ models and roles for community members[25].[26] The involvement of communities in energy initiatives can therefore take various forms from project initiation, administration, development, decision-making and financial support (Rogers et al 2008). In addition, community energy initiatives diverge in terms of their stage of implementation, drivers for initiating and continuing with an initiative and the level of support they obtain from local people. Such support often depends on the distribution of economic, social and environmental gains in particular when community groups try to implement renewable energy systems (Walker and Devine-Wright 2008). The diversity of community energy

[17] The differentiation that can be made is therefore based on the group's origin and consequent varying levels of autonomy and dependence (Steward et al 2009).

[18] Social organisation refers to the "collection of values, norms, process and behaviour patterns within a community that organise, facilitate and constrain the interactions among community members" (Mancini et al, 2003; 319) such as degree of participation and the manner of governance.

[19] The legal status of initiatives can be divides into: a private limited company, a public limited company, a company limited by guarantee, an industrial and provident society, a charity and a limited partnership. This choice of status has an influence on the way money is raised, rewards/ risks are expected and relationship are formed (DTI 2000). Some groups might have more informal structures and can therefore vary in their measure of formality (Steward et al 2009).

[20] The financial structures consist of: co-developers (delayed investment, community without debt), co-developers (upfront investment, community without debt), community developers (upfront investment, community with debt) and community developers (upfront investment, lease) (DTI 2000).

[21] Partnerships and networking can exist between voluntary, public and private sector groups. Initiatives can originate from the bottom-up, top-down or in partnership.

[22] The resource base can consist of: limited commercial activity, grant funding, voluntary input and mutual exchange.

[23] The following ownership models exist: cooperatives, community charities, development trust and shares owned by local community and in relation to renewable energy: community company, public body owning existing property, existing community organisation owning building, private ownership by local entrepreneur or ESCO (Walker 2008).

[24] The following development models exist: developer-led project, existing group-led project, small group-led project and new group-led project (DTI 2000).

[25] Community members can take the role of a financial investors, project participants, project supporters or local beneficiaries (see complete list Walker and Cass (2007). These relationships can either be personal or remote, ongoing or infrequent and direct and indirect (Steward et al 2009).

[26] Some of these themes particularly relate to field of community renewable energy.

initiatives is not only marked through their social, legal and organisational arrangements but also in terms of the type and scale of community group involvement (such as based on interest, geography or socio-demographic background) and the technologies employed.[27]

The focus of improving the energy system is the final key variable that describes the diversity of different community energy initiatives, often establishing the purpose of the project and the nature of the group's approach. Researchers have divided the field of community energy into renewable energy, awareness raising, behaviour change, energy efficiency and energy conservation. Some studies split the field into renewable energy, energy efficiency and energy conservation[28] (St. Denis and Parker 2008), whereas others exclude energy conservation but include behaviour change and awareness raising (Ison 2010) or next to renewable energy combine all fields by calling them 'energy savings programmes' (CAG Consultants 2010). These divisions might merely be an analytical tool to divide the diverse field of community energy rather than ones that exist in practice. Community energy initiatives often focus on more than one field of activity, as outlined in the review of applicants to NESTA's Big Green Challenge (Capener 2009; Steward et al 2009) that focused on activities to tackle climate change. In this particular study the range of CO2 reduction measures were often interlinked, as applicants aimed to develop holistic approaches to climate change that could potentially drive a more systemic change. Applicants to the Government's Low Carbon Communities Challenge programme similarly proposed sets of interlinked activities (such as activities linked to behaviour change and awareness raising). Steward et al (2009: 159) have therefore proposed that the distinction between community groups should be grounded "in the way they approached the problem of carbon reduction" rather than distinguishing between the particular carbon reduction focus (see full outline of approaches in report). The integration of one or numerous CO2 reduction activities stresses even further that initiatives create an enormous diversity.

[27] Steward et al (2009: 22) have differentiated between the Big Green Challenge applicants referring to their: 'focus', 'formality', 'group type' and 'membership profile'. They have pointed out that "these classifications have a utility beyond describing the group of BGC applicants in that they provide routes into well-established measures relevant to organisational analysis with the innovation literature (e.g. size, maturity, formality, autonomy).

[28] St. Denis and Parker (2008) define the supply side of 'energy efficiency', as efforts to reduce the waste of energy during the delivery and generation and the demand side, as the ability to perform the same services whilst using less energy. 'Energy conservation' is defined as a reduction of energy demand. On the supply side this reduction relates to provision of goods and services and on the demand to actions that initiate an increase of energy conservation. The 'implementation of small-scale renewable energy generation' ensures a reduction of environmental impacts because energy is generated through a regenerative source rather than a non-renewable one.

Walker and Devine-Wright (2008) have argued that this diversity is one of the key characteristics of community energy initiatives[29]. After interviewing policy makers, community participants and local residents about their understanding of community renewable initiatives, Walker et al (2007: 7) were able to identify two 'discursive resources' that start to encapsulate some of the diversity. These discursive resources either entailed a 'process' or an 'outcome' aspect. The process dimension relates to the initiation and development of the initiative in terms of degrees of community involvement and decision-making. These processes can operate between two ends of a spectrum, between being completely 'open, local and participatory' at one end, to 'closed, distant and institutional' at the other end (Walker et al 2007: 8). The outcome dimension is concerned with the distribution of initiative benefits where outcomes vary between being 'distant and private' and 'local and collective' (Walker et al 2007: 8). According to Walker et al (2007), what makes community energy initiatives distinct from other energy approaches is the local and collective character of the outcomes achieved and the open and participatory process employed.

This distinction is not always employed when defining community energy initiatives in practice. Walker and Devine-Wright (2008: 497) have recognised that "exactly what community renewables does and should mean was a recurrent theme of discussion and analysis" after interviewing numerous community energy actors. Definitions were created on 'pragmatic, strategic and normative' (Walker et al 2006: 10) grounds. The numerous definitions represent different viewpoints that determine which community energy initiative can or cannot be labelled as 'community'. These viewpoints can derive from the community groups themselves but also depend on agendas set out by institutions and funders. Debates have started to emerge that consider the use of the word 'community' in some energy initiative as a mere rhetorical device in order to gain greater public acceptance for even large scale renewable energy developments (Hoffman and High-Pippert 2009). Initiatives are interpreted as 'community-based' not because the community is involved in the initiation or development of the initiative, but because some of the gains generated flow into a community fund. Such approaches to community energy often need to define who belongs to the local community of beneficiaries, as a self-defined community often does not exist. The boundaries of the community are therefore often not easily determined (Aitken 2010). Initiatives with a community label that do not develop cohesiveness between

[29] Note Walker and Devine-Wright's (2008) research project had a particular focus on community renewable energy initiatives.

local people and the initiative group can create disagreements and ruptures to the development process (Walker et al 2009). Local people can feel misled when benefits mainly go to the initiative developers rather than the local community, particularly in the case where initiatives were communicated as being community-based.

Some of the pragmatic and strategic interpretations of community energy can be criticised for including only minimal community involvement and benefits. These initiatives might be accused of making use of a community label that has been stretched too far from its normative interpretations. On the other hand, the current lack of clarity with regards to defining community energy has allowed for numerous malleable interpretations to exist, providing communities with a space to be innovative with numerous approaches to community energy (Walker and Devine-Wright 2008; Walker et al 2006). The unstructured approach of linking national programmes with local groups permitted a vast diversity of project developments in relation to their "form, function, scale and context" (Walker et al 2006: 11). This diversity might not exist if an excessively narrow and top down interpretation of community energy would have been imposed. Walker and Devine-Wright (2008) draw attention to the two sides of the argument – the diversity of community energy interpretations being on the one hand its strength but on the other a weakness. On the positive side of the argument the lack of clarity has permitted numerous approaches to co-exist and for others to be developed that are appropriate for a local context. In addition, the diversity of initiatives has encouraged a high interest in community energy from a variety of actors. Whereas on the negative side, what makes community-based approaches distinct from other approaches is that they are locally led and collective, characteristics that might get lost if the vagueness of community energy interpretations continues to exist.[30] Walker et al (2007: 78) have argued that future interpretations need to guard against "both the longer term dissipation of grassroots energies and the covert legitimization of poorly conceived private interest projects as community-driven".

Walker et al (2009) also are critical of interpretations that assume a certain cohesiveness of people's relationships within a community, as they often only consider the positive qualities and nature of these groups (see also Hoffman and High-Pippert 2009). Many positive

[30] In the context of community renewable energy projects developing a clear understanding of what kind of projects should be labelled as community-based is essential when thinking about the distribution of project's gains and costs. Walker and Devine-Wright (2008) have discovered that if local people get the feeling that there are no gains for the community from energy projects, despite them being labelled community-based, then people increasingly object to and resent renewable energy projects.

qualities associated with the term 'community' are more problematic when examining these relationships in everyday life. Communities that might appear from the outside to be inclusive can be regarded by local people as being exclusive, marginalising people who feel that they do not fit in or are unable to join (Harvey 1996, Williams 1976). Fractures can occur not only between local people and initiative members but also within the community initiative itself. Visions for the future and decision-making processes can unite but also fracture communities, as people join and leave communities or split from the group. Communities are not static; they evolve and with them people's relationships. They are dynamic and transient (Walker et al 2009). When viewed in this way, "a community may be better understood as a political and social process rather than a taken-for-granted social geographic entity" (Dalby and Mackenzie 1997: 100). In order for community energy initiatives to develop people need to join the initiative and perform the various day-to-day activities that make up the project work, otherwise it ceases to exist.

Originally, in our CISE proposal, we suggested that a community energy 'niche' could be sub-divided into three niches: supply; demand; and awareness. We are already learning from the literature that these imposed categories risk being problematic; 'community energy' is both very diverse, in terms of its meanings, scale, organisation, boundaries, socio-technical practices, and so forth. We could spend the entire project (as other projects have done) simply trying to capture this complexity and organise it into schemes and typologies. We fear this risks losing sight of our original aims. We need to build on the efforts already undertaken by others and use it to help us characterise and select community energy innovations for study. A key consideration that we need to keep in mind is how our own pragmatic, strategic or normative interpretation of community energy initiatives impacts on our research aims. A narrow and normative interpretation could be regarded as not capturing a complete picture of innovative activities in the community context. For example, some of the community-based approaches led by local governments have been extremely successful in other European countries. On the other hand, if the team decides to apply a more far reaching definition of community energy initiatives, they could be accused of ignoring key aspects of the community-based approach that makes these initiatives so distinct from other approaches. Methods for dealing with the diversity of community energy initiatives are discussed in more depth in the next section.

Methods for dealing with the diversity of community energy initiatives

Clearly, a defining characteristic of 'community energy initiatives' is their diversity and complexity (Walker and Devine-Walker 2008). This diversity can be regarded as a methodological challenge when trying to examine these initiatives through qualitative research methods (such as case studies). Research studies in the past have therefore developed various variables to categorise this diversity and to be able to determine the scope of their research (see discussion above). In order to gain more in-depth insights into the initiatives, working only with a few cases, research projects either reduced some of the variables (Walker et al 2007) or outlined key selection criteria (Ison 2010). The rationales for this reduction or outline of key criteria are often based on a mix of practical reasons, such as the resources available for research and accessibility to initiatives, and the overall aim of the study, such as whether one seeks representative breadth or specific analytical depth. For example, Walker et al (2007) early on in their research project decided to only concentrate on renewable energy initiatives instead of examining energy efficiency, awareness raising and behaviour change initiatives – variables that describe the 'purpose of a project' (Ison 2010). According to Walker et al (2007: 3) "this alone [investigation of renewable energy initiatives] proved a substantial research task". In addition to determining which 'purpose of the projects' to examine, they adopted a regional[31] approach to conducting their case studies and mainly concentrated on 'communities of locality' rather than 'interest'. The rationale behind this approach was based on the aims of the study (i.e. to examine political factors that impact on the emergence of initiatives) and practical reasons (i.e. accessibility of group). The advisory board played a key role in developing the study's selection approach.

Instead of primarily relying on reducing the number of variables, Ison (2010) developed five criteria[32] for the selection of her case study initiatives. These criteria allowed her to have a more flexible selection approach and to determine the overall scope of the research whilst taking into consideration the overall aim of the research. The aim was to examine the governance structures of community energy groups. In order to be able to compare these structures, one of the criteria was based on each initiative being at a similar stage of implementation: "that the projects are well established and with the energy technology having been installed and operating for over a year" (Ison 2010:12). Whereas another criteria was concerned with the study's aim to examine initiatives that make use of different technologies. This criterion allowed the researcher to explore whether governance

[31] Regions that were included: Wales and North of England

[32] The five criteria were: 1. "That the projects involve continued operation of renewable energy infrastructure." 2. "That the projects are well established and with the energy technology having been installed and operating for over a year." 3. "That the projects use different technologies." 4. "That the projects are accessible by public transport from Lancaster." 5. "That those involved in projects are willing to participate in the research project." (Ison 2010: 13)

structures are related across the different technologies. The selection criteria highlight key aspects of the research aim. For other research studies on community energy there is an even greater link between research aims and case study selection. For example, Warren and McFadyen (2010) examined public attitudes to onshore wind farm developments, in particular trying to compare community-owned with developer-owned approaches. The selection of two neighbouring islands with onshore wind farms but one being community-owned and the other developer-owned seemed to be an appropriate choice. Because most other factors between the two islands (such as sharing the same local paper and secondary school) are closely similar, it was possible to examine whether the ownership of a wind farm has an impact on public attitudes towards it.

At its core, the CISE project seeks to understand innovations in community energy, and the diffusion of those innovations. Analytically, we propose to use niche-based approaches from innovation studies to help us understand innovations in community energy, and to the extent that this helps us explain local community innovations and recommend improved support, we will thereby test the adequacy of niche theory (and adaptations to it).

The initial survey will help us to uncover a variety of different initiatives. It will build on our research aims and therefore should already provide us with some insights into what type of projects we would like to work with (we therefore feel that there is still time to think about a more definite sampling strategy for the case studies). The survey can get a wide cross-section of views from community initiative leaders about what they understand to be innovative, how diffusion happens, and get data on the prevalence and performance of different innovations. We could look at more conventional, firm-based innovation surveys for ideas about survey design.

At present, in order to deal with the diversity of community energy initiatives, we therefore propose firstly, a sampling strategy close to our project aims, secondly, a 'distinctive' definition of community energy projects to narrow down some of the diversity (we already realise that we are unable to sample for lots of different types of 'communities' as well as different types of 'energy initiatives') and thirdly, an overall pragmatic, staged and flexible sampling strategy for our case study. Drawing on Flyvbjerg's (2006) examination of case study selection procedures, our sampling approach could potentially be described as an 'information-orientated' selection strategy. Within this strategy we could have a 'maximum-variation' and an 'extreme/deviant' approach to selecting our cases (Flyvbjerg 2006: 230). An 'extreme/deviant' approach would allow us to examine 'failed' cases whereas a 'maximum-variation' approach makes it possible to explore a range of initiatives in relation

to pre-defined criteria to maximise the diversity of the sample. Considering these selection procedures, we could have a 'staged' and flexible sampling process whereby we pick the first 3-4 cases based on a particular sampling strategy. We could then revise and evolve the sampling heuristic based on the selection of the initial cases studies. The criteria that make up the sampling heuristic can be more (see outline below) or less defined before working with the first cases.

With a more detailed sampling strategy we have to be clear about our purpose and aims of the overall research, which is about the diffusion of innovations in community energy. The research strategy could, therefore, be to survey the kinds of innovations being generated within the field of community energy; in parallel, we will choose a limited number of relatively discrete 'innovations' to study in depth. Innovations might be chosen that are emblematic of different types of community energy. So, for example, community-share issues for wind farms (large-scale, community ownership); co-operative energy service companies embedded in local communities; novel participatory governance structures for local energy initiatives; etc. We do understand that this approach might be problematic. It might be difficult to categorise community energy initiatives in terms of emblematic innovations. The 'innovation mix' might be extremely diverse within individual initiatives. We also need to develop an understanding of what we actually mean by community innovation – as pointed out by one of our team members, "arguably, every community energy initiative is 'innovative'". Our advisory panel and interviews with intermediaries can provide advice on what types of innovations are being developed and currently exist, which innovations we should study, why we should study them, and how they relate to the characterisations of community energy in the literature.

Having developed a potential rationale for selecting community energy innovations (i.e. choosing a number of relatively discrete 'innovations' to study in depth), we are able to think through a possible example[33] of how to incorporate the rationale into our case study

[33] Two other examples: firstly, the case studies could look at six or less innovations in depth. This would include examples that have 'well-developed' innovations, and later examples where the innovations are still being defined or adapted to the local context. (Similar to idea number one but instead of identifying cases in terms of: 'originating and 'replicating' examples, this version puts emphasis on the stage of implementation). Our network analysis could try and cover linkages and intermediaries in as many examples of these particular innovations as possible – to try and look at the structures and processes of diffusion. Secondly, the case study and social network analysis could look at two different areas, including numerous community energy projects and innovations. These two areas or clusters could be identified during the survey and potentially vary in terms of their network, innovation, etc.

selection criteria. The case studies could look at two examples of each innovation in depth. Ideally, this would be an originating/exemplary/iconic example, and a later replicating/diffusing example. Diffusion is often built on further innovations of the basic socio-technical form, and hybrid forms, which we would try to capture in the 'paired' case studies (note: twelve cases imply six innovations can be studied). Our network analysis could try and cover linkages and intermediaries in as many examples of these particular innovations as possible – to try and look at the structures and processes of diffusion. Although a first attempt, we can already see some problems with this strategy - we might struggle to identify clear 'originators' and 'replicators'. With this particular approach it might seem that we assume that it is possible to identify 'originators' and 'replicators' before even conducting the research. This might also lead to an impression that we know from the outset what 'diffusion' is and that it occurs in the field of community energy. However, in our proposal we stated that we want to examine 'whether, how and why' these projects diffuse. Innovations and other specific features of initiatives can unfold whilst working with the cases (as part of the research process) and often cannot be taken for granted or be identified beforehand. In addition, we might find that there are mixes of different kinds of origination and replication within all projects (such as the ownership structure might have been copied but the form of community engagement might be innovative).

Although there might be some significant issues with the above-described selection criteria (i.e. identifying two example of each innovation), the temporal dimension (implied in identifying 'originators' and 'replicators') might be crucial when trying to examine innovation and diffusion processes. Instead of trying to identify 'originators' and 'replicators' we could try to work with initiatives that are at different development stages (see for example d'Este-Hoare (2010) outline of six-stages[34] in the development of

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ability/ opportunity. Within these areas/ clusters we could potentially identify 'originating' but also 'diffusing' examples. We might be able to discover diffusion processes whilst conducting the research without having to presume them beforehand.

[34] D'Este-Hoare (2010: 19) has divided the development of community carbon reduction groups into six-stages: 'Formation' – a number of people get together and discuss their ambition in reducing their carbon emissions, 'Going public' – a group is formed and more participants are gathered, 'Enthusiastic action' – a formal carbon reduction group has been formed, working on various activities to reduce carbon emissions, 'The project' – a large-scale project is identified, 'Raising the money' and ' Sustainable Enterprise' – the project has been set up and allows the group to have a regular funding stream (see also DTI (2000: 4/5) report for their more detailed outline of development stages). These development stages can be beneficial when trying to identify 'originators' and 'replicators' without assuming that they exist before even starting the empirical work. 'Originators' might have already entered a later stage whereas 'replicators' are at in earlier stage. Still, these stages should be treated with care as they are also based on a few assumptions and generalisations. For example, not all community energy initiatives want to become 'social enterprises' and some 'originators' may never go any further than the stage of 'enthusiastic action' whereas some 'replicators' might have already reached this stage to become self-sufficient. The timing of the stages and their order might depend on the individual circumstances of each initiative and therefore might make it difficult to differentiate between 'originator' and 'replicator'. The stages could still be useful to aid the process of identifying the different development stages of each initiative to be able to reflect on which innovations become important at what stage.

community carbon reduction groups). This way we might be able to identify 'originators' and 'replicators' through conducting the research without assuming that they exist before even starting the empirical work. We could also find that different kinds of innovations are important at different stages of implementation within the same project and that, beyond this, each of these different kinds of innovations might follow different patterns of 'diffusion'.

Whilst the central focus is on innovations, the CISE team must nevertheless consider some of the 'community' questions that other research is generally asking of this diversity of initiatives: participation, representativeness, mobilising wider awareness, green values, etc. After all, the CISE project proposal suggested that community-based innovation is different to firm-based innovation, and so CISE team need to understand relationships between community and innovation. How does each of the cross-sections of innovations derive from particular types of 'community', enable the performance of certain forms of community, or reinforce certain forms of inclusion/exclusion? However, the central focus remains on how 'community' settings influence the development and diffusion of different socio-technical energy innovations within local communities.

In the past innovations and community activities have mainly been considered as separate strands in debates on sustainability. Innovations are linked to attempts from business to develop more environmentally sound products and services and community activities to bottom-up endeavours to develop more sustainable ways of life. Only recently have researchers pointed to the significance of considering community actions as a "site of innovative activity" (Seyfang and Smith 2007: 584). The increased interest in the innovative potential of community activities and key similarities and differences between business, social and bottom-up innovations is the subject of the next section.

Community energy initiatives as innovators

The development of innovations is considered as key necessity whenever businesses aim to increase their market power and maximise their profits. Private sector businesses are keen to improve their effectiveness when competing in the global environment through innovative products and processes. In the past the literature on innovations has therefore mainly concentrated on idea generation processes that are key to identifying market opportunities or on the diffusion of novel technological outcomes that try to fulfil a market need. Increasingly researchers have recognised that innovations are not only driven by commercial factors but also by aspirations to solve social problems (e.g. Mulgan et al 2007

and Bacon et al 2008) i.e. 'social innovations' and to deal with the environmental challenge i.e. 'sustainable innovations'.[35] In 2003, the UK government proposed in their 'Innovation Report' that innovations do not only play a key role in providing business profits but also in dealing with the environmental challenge. A link was constructed between business innovations and sustainability.

Much discussion, analysis and promotion of sustainable innovations presumes they operate within the market economy similarly to other business innovations. When first developed tax breaks and subsidies can 'protect' these types innovations from market competition so that they can be fully developed to compete in the market. Whilst undoubtedly important, an exclusive focus on commercial sustainable innovations risks overlooking grassroots innovations operating in civil society settings. Seyfang and Smith (2007) have highlighted that sustainable innovations that are aligned within conventional market economics are only regarded as successful or able to prosper if they are more profitable than their alternatives. Nevertheless, social and sustainable innovations do not only operate in the market economy but also can be initiated by civil society in contrast to mainstream business, industry and government innovations. They can potentially operate in the social economy of social enterprises and community activities. These types of innovations have been termed 'grassroots innovations' (Seyfang and Smith 2007).

In the white paper 'Innovation Nation' (2008) the UK government recognised that they need to widen their understanding of innovations with regards to their 'form', 'location' and 'source' (Steward et al 2009: 1/2). Firstly, the location of an innovation refers to its origination. Innovations are not only created profit driven businesses but also in public organisations and in the third sector such as in community energy groups. The UK government therefore acknowledged that innovations developed in the third sector have been widely undervalued. Secondly, the person who develops an innovation i.e. the source is not only a producer and supplier but can be a user (Von Hippel 2006). Finally, the UK government recognised that innovations are new ideas for practices and services in addition to products and are not only technical but also social and socio/technical (Steward et al 2009). In the past the third sector has been regarded as lacking the capacity to innovate

[35] The distinction between business, sustainable and social innovations might be useful when trying to identify their differences and similarities. However, this distinction in some cases cannot be easily made, as social innovations can be applied by businesses and business innovations by initiatives that aim to gain social and sustainable rather than financial values (Mulgan et al 2007).

because of the various challenges they have to face. For example, it is believed that the third sector lacks resources, skills and finances to produce long-term plans and is not put under the same market pressure necessary for any organisation that innovates (Mulgan et al 2007). The third sector mainly aim is to fulfil the needs that are currently not covered by the market economy rather than to be innovators.

In the academic literature more generally innovations have been referred to as "both a process and a product" (Phillis et al 2008: 37). Firstly, an innovation can be considered as an outcome of process such as an idea, a concept, a technology, a product, a product feature, a production method, a service but also a social practice, a business practice/ model, a procedure for structuring collaborative work, a form of governance, a legislation, an institution, an organisational arrangement[36], a social movement, a social structure or some combination of them (Bergman et al 2010, Mulgan et al 2007, Mumford 2002). Secondly, innovations can refer to the process that leads to an outcome or diffuses it – the process of innovating. Research in this particular area examines how outcomes can be produced more successfully through exploring the various factors and social and organisation processes that impact on the development of innovations. On the other hand, research that considers innovations as outcomes mainly concentrates on ways of predicting the success of innovations, their origins and economic, social and technical impacts.

An outcome or process can only be viewed as innovative if it is a 'novelty' and an 'improvement' of the previous alternatives (The Young Foundation 2006). An improvement often relates to the efficiency and effectiveness of an innovation and as added by The Young Foundation (2006) to an increased sustainability. Novelty does not necessarily refer to originality but also to a process or outcome that is new to the context. Innovations can occur concurrently in different fields, as they are the result of similar social, technical or economic changes. Willis et al (2007) refer to the work of David Edgerton, who is cautious about defining innovations in terms of novelty. Discourses surrounding ideas of novelty often focus on patents and technologies rather than on examining technologies in use and their transferability to numerous contexts and places.[37] In order for processes and products

[36] Innovative organisational forms can relate to new structures to administer and manage organisations and finances such as the structure of decision-making processes.

[37] Capener (2009) has pointed out that innovations at the community level make use of ideas, concept, technologies, etc. from elsewhere. "It is less about re-inventing the wheel and more about utilising leadership, ingenuity and creativity to build approaches

to be viewed as an innovation, Steward et al (2009: 10) has differentiated an innovation from an invention,

"The distinguishing feature of innovation (in contrast to invention) is that it involved the development of a new idea into something which achieves widespread adoption or change."

Defining innovations in terms of their possibility to spread – their implementation and diffusion - mirrors Steward's et al description of an innovation, "the successful exploitation of new ideas" (2009: 7) and The Young Foundations' definition, "new ideas that work" (2006: 9). These definitions also differentiate innovations from incremental changes that only represent slight improvements from previous alternatives.

The literature does not only divide innovations into business, sustainable and social innovations but also sometimes differentiates between social and technological innovations. Bergman et al (2010: 5) have pointed out that the term 'social' in conjunction with innovation can refer to two things: "(1) the benefits stemming from the innovation, which accrue primarily to society as a whole rather than private individuals/ business etc. (2) the means used to solve the problem". Scott Cato et al (2007) have claimed that the most significant innovations in the renewable energy market are not technological innovations but rather social innovations. These social innovations are linked to new ways of measuring and distributing returns and are grounded in new organisational forms such as co-operatives and mutual enterprises. The distinction between social and technological innovations seems to be key when trying to emphasise that not all innovations are technological. However, Bergman et al (2010) have argued whilst referring to MacKenzie and Wajcman (1999) that "all innovation, including technological innovation, is social in the sense of being the outcome of a creative process involving a range of actors, and usually requiring some change in behaviour among adopters".

Even though a considerable amount of research exists on technological and market-orientated innovations as opposed to social innovation, key debates in the literature on innovations are still unsettled. Uncertainties exist, for example, in relation to the role of

specific to local needs and aspirations" (Capener 2009: 3). For example, biomass schemes can be considered as innovative but "it's not rocket science" (case study participants in Willis et al 2007: 13).

intellectual property in stimulating innovations and the role of entrepreneurs in driving change (The Young Foundation 2006). Nevertheless, The Young Foundation (2006) has argued that the research on technological and market-orientated innovations is comprehensive and therefore could potentially inform the more understudied body of work on social innovations[38], pointing to the various similarities and differences between these types of innovations. Research on business innovations has mainly concentrated on examining the process of generating innovations in organisations, the difference between closed and open innovations[39] and the role of users in the innovations process. Other strands of research have focused on the diffusion of innovations specifically the role of actors, networks and social systems and structural elements that impact on the acceptance and implementation of ideas. This research has highlighted the important role of intermediaries, making connections between actors and in the process aiding the diffusion of the innovations. The diffusion process of innovations from idea, experiment and prototype to mainstream product or service seems to be a key challenge when creating business and social innovations (The Young Foundation 2006).

The literature on social innovations that has particularly focused on bottom-up and sustainable innovations has been described as being unconnected, lacking both theoretical and empirical unity (Bergman et al 2010). Bergman et al (2010) have argued that researchers who contribute to this body of work frequently do not refer to each other's work as they add to various currently unrelated bodies of literature such as writings on social movements and community development. Although in most instances these researchers explore the innovative potential of bottom-up initiatives, they rarely use the term 'innovation'. Seyfang and Smith (2007) have advocated characterising any type of bottom-up solutions, social or technological ones, developed in the civil society arena and that address issues surrounding sustainability as 'grassroots innovations'. Instead of relying on market drivers these initiatives are organised from the bottom-up, outside the mainstream market. Chanan (2004) has discovered that four out of five initiatives

[38] For example, Steward et al (2009: 60) have referred to Mulgan et al's (2007) work that examines varies models that focus on the diffusion of innovative ideas in the business context. These are "based on different levels of control retained over 'what, who, where and how' diffusion occurs. This ranges from 'uncontrolled diffusion' where the idea is allowed to spread informally through 'directed diffusion' which can include promotion through formal networks, and various loosely controlled scaling up mechanisms such as federations, licensing or franchising… through takeover by a more powerful organisation to finally organisational growth."

[39] An innovation is considered as 'closed' whenever the innovation process lies with an organisation, rather than being shared. The source of the innovation (closed or open) has implication on its diffusion (Steward et al 2009).

associated with the grassroots arena are voluntary, low-profile, small, community-driven and citizen-led initiatives. Seyfang and Smith (2007: 585) define grassroots innovations as

"networks of activities and organisations generating novel bottom-up solutions for sustainable development; solutions that respond to the local situation and the interests and values of communities involved."

The innovative potential of these initiatives, for example, is reflected in their attempt to create organisational structures in which people can explore new ways of engaging with each other and the wider community.

Although the literature on community energy often does not use the term 'innovation' when referring to various community activities, this does not mean that community initiatives and the various other actors involved do not regard themselves as innovators. Community activities can be considered as 'grassroots innovations'. Community activities and grassroots innovations frequently exist in the social economy, build on social values and drive motivations that are 'alternative' from the mainstream. The term 'innovation' has started to appear more frequently in recent publications on community energy. For example, the winners of the 'Big Green Challenge' had to illustrate "their innovation goals and processes" to receive funding (Capener 2009: 2) and a recent survey conducted by the Low Carbon Communities Network (LCCN) as part of the 'Communities and Climate Action' conference asked community groups to describe an activity or project they were involved in which the regarded as innovative. Moreover, Willis et al (2007) examined existing low-carbon innovations and used community initiatives as case studies to illustrate their 'disruptive innovation' potential in reducing carbon emissions.

The overall aim of the Big Green Challenge was to promote community-led innovations (Brook Lyndhurst 2010: 1). The conception of innovation was key to the challenge in numerous ways. The approach of the competition itself was innovative. It tried to have a 'challenge-led' approach to supporting community approaches, rather than providing traditional grant funding. The project explored how such a challenge prize could stimulate community-led innovations (Houghton 2010).[40] Further, the community initiatives were judged on the innovativeness of their approach to tackle climate change in addition to four

[40] The advantages and drawbacks of such an approach was evaluated by Brook Lyndhurst (2010).

other criteria: community engagement, reduction in carbon emission, potential for scaling or replicating innovations and prospective longevity of the initiative. As part of their application form initiatives had to answer how they think their ideas of tackling climate change are innovative. Examining the proposal of the applicants, Brook Lyndhurst has identified numerous innovations,

"The BGC revealed some notable innovations including new and more effective ways of delivering home energy checks, innovative use of behaviour change tools (such as pledges); entirely new measures to influence energy behaviour (e.g. a voluntary consumption limit); and new legal, financial and governance structures to support community ownership or renewable energy." (2010: 4)

An innovation could be based on a new idea but also derive from creating new combination of existing things or discovering new ways of implementing existing solutions. As outlined by Capener (2009: 3), "it is less about re-inventing the wheel and more about utilising leadership, ingenuity and creativity to build approaches specific to local needs and aspirations". Innovations were defined in the widest sense.

In addition to identifying various community-led innovations, Steward et al (2009) discovered numerous categories that try to characterise these types of innovations. Firstly, they divided community-led innovations into being either a product/service or practice. Products and services relate to the instalment of equipment, technical measures or services offered that are aimed at carbon reduction. The choice of product/ technology could be innovative but more often it was the combination between product and process that made the proposal innovative. Practices refer to innovations that include various ways to bring about behaviour change to tackle climate change. Some proposals involved both practices and products/services. Secondly, a distinction was made between the different levels of interactions between the carbon reduction measures. These measures could either be focused on one single measure (such as reducing car use) – singular, on numerous unrelated measures (such as loft insulation and reducing car use) – multiple or on a variety of linked measures – systemic. Systemic level measures could link to a household, community, supply chain, building or individual. The final innovation category was based on who would be responsible for the longevity of the innovation (such as a challenger group or a community group). In addition to developing the above categories, Steward et al (2009) considered the

feasibility of each innovation (or 'innovation package') and created a distinction between innovations that attempted to engage with 'niche/regime' carbon reduction goals. Innovations either aimed to be part of an existing regime (such more efficient light bulbs) or 'moved away' from the regime.

Some of academic research studies have started to draw on transition theory to examine the interrelationship between grassroots innovations and incumbent system of mainstream practice, making use of concepts surrounding the strategic niche management (SNM), the multi-level perspective (MLP) and transition management (TM). Exploring grassroots innovations in the context of body disposal practices, Monaghan (2009) has pointed out that recent research has focused on the challenges and benefits of grassroots innovations in the context of sustainability rather than on how these alternative activities could be supported to have an impact on the mainstream practices. The relationship between innovations and social and technical changes has been explored more widely in numerous reports published by NESTA (such as Mulgan et al 2007 and Willis et al 2007), sometimes considering the potential of grassroots innovations. For example, Steward (2008: 24) has referred to the work of Lessig on 'innovation commons' to illustrate the potential of this particular model when thinking about low carbon transitions. He has suggested that when applying an innovation commons model to develop a more interactive electricity network, it is possible, for example, to imagine more bottom-up innovations in energy supply.

The CISE project aims to link the literature on innovation with community actions, recognising that grassroots actions currently seemed to be a neglected site of innovations for sustainability. By viewing community-level activities as innovations, we gain a better understanding of the potential role of grassroots initiatives, as well as insights into the challenges they might face. As already discussed in the 'methods of dealing with the diversity' section, to categorise different community innovations in terms of emblematic innovations might be difficult, as the 'innovative mix' might be extremely diverse in each community initiative. This issue is further verified by Steward's et al (2009) conclusion that most of the initiatives in the Big Green Challenge instigate innovations that relate to a particular product/service and a practice, creating an 'innovation package'. Even though numerous initiatives seems to have developed an innovative mix, the existing literature on business, social and grassroots innovations points to various more general aspects on how innovations can be defined. Firstly, innovations can refer to a process and a product:

products, services and practices can be innovative but also the process of generating and diffusing innovations. Community energy initiatives potentially are innovative in the way they make decisions, divide power, share responsibility, think about ownership, try to engage with the wider community, try to find strategies to stay 'alive', gain access to resources, develop capabilities to act, create partnerships and networks, engage in various activities to develop low carbon solutions, employ renewable technologies and sustainable products, create visions for the future…

Secondly, innovations are not only defined in terms of novelty. An innovation could be based on a new idea but also derive from creating new combination of existing things or discovering new ways of implementing existing solutions. It can be an 'improvement' of previous alternatives or new to the context. These types of innovations could be regarded as incremental rather than radical and therefore not of interest to CISE project, considering its emphasis on radical innovations. However, for the CISE team the radical notion of an innovation might not only refer to its novelty but rather to the initiatives aim of implementing innovations that are developed outside an existing regime. Innovations can work with the regime or try to challenge it.

Considering the literature above, the following questions arise for the CISE team: What criteria determine their success? Is a windfarm owned by a cooperative still innovative? When do these activities lose their innovative status? What makes these innovations different from business innovations? Should social and technical innovation be differentiated from each other? How useful would such an approach be? In order to be considered an innovation, do these new ideas need to 'work' and diffuse?

The diffusion process of innovations from idea to seeding transformations in wider socio-technological regimes mainstream is a key challenge for any types of innovations. These transformations are the subject of the next section whilst considering the community energy context.

Diffusion processes: replication, scaling up and translation of community energy initiatives

The process of replication, scaling up and translation of community-led energy initiatives is captured in the concept of diffusion. In order to examine the state of the community renewable energy field in terms of diffusion activity, Walker et al (2006) have employed a transition and niche management framework[41] (Rip and Kemp 1998, Smith 2006). They have particularly focused on the interrelationship between community renewable energy policy, programmes and practice to examine how these links have impacted either problematically or positively on diffusion and niche[42] protection activities. Walker et al employ Smith's (2006) flexible interpretation of niche development when examining governmental programmes that support the development of community project innovations outside the mainstream (i.e. the attempt to develop protected spaces). Here, 'niches' are networks of similar sustainability projects distributed spatially and temporally that enable participants to do a number of things: learning from one another and making demands for facilitating policy and market reforms on the basis of those lessons; helping to mobilise resources for future initiatives through their networking activities; and shaping expectations about the initiatives' role in wider sustainable developments in the future.

Policy and governmental programmes for community energy initiatives did not emerge from a "single strategy move" (Walker et al 2006). According to Walker et al (2006), such a lack of strategy had three key positive impacts on diffusion processes of community renewable energy initiatives (Walker et al 2006). Firstly, it allowed for a growing number of initiatives to evolve that have been extremely diverse in terms of their aims, origins and ambitions and a variety of actors and organisations to be involved. Secondly, community members were able to develop their own diverse local solutions without top down government directions. This was achieved by creating direct links between government support programmes and community groups without relying on existing regional governmental structures. Finally, community energy groups could draw on numerous funding streams and resources, allowing creative innovations to emerge from the bottom up. The enrolment of numerous actors and diverse support strategies are key features of niche building processes that Walker et al (2006) have argued to be at least to some degree observable in community RE initiatives.

[41] "In recent years a literature on sustainability transitions has emerged which frames social change as occurring within a multi-level perspective (MLP) of micro, meso and macro level systems (Rip and Kemp 1998; Rotmans et al 2001; Smith et al 2010; Grin et al 2010). Drawing explicitly on insights from studies of past socio-technical transitions, sustainability transitions offer both a conceptual framework and nascent management tools for understanding and governing transitions" (Seyfang et al 2010).

[42] The literature on socio-technical systems (Geels and Schot 2007; Rip and Kemp 1998) examines interactions between niche and regime developments in terms of transition management.

Walker et al (2006) have argued that the identified strengths apparent in the working relationship between government programmes and community groups are in parts also its weakness when reflecting on the diffusion of community energy initiatives. Although the lack of strategy enabled various initiatives to grow within a creative and flexible space, overall there seems to be an absence of "intentionality and continuity" in the niche development process. This is one of the key aspects in transition management. Rip and Kemp (1998) have proposed that in order to be able to promote and support transitions, then 'long term goals' and effective learning mechanisms need to be formulated that guide the transition process. In this case, the 'transition' would be the emergence of a wide-scale and significant community energy sector within the national energy system.[43] Walker et al (2006) have concluded that such overriding visions are not in place. Goals for community RE are based on short term strategies that do not consider how the current energy system could be replaced by a more distributed and locally owned system, "remaining firmly in its expanded but not transforming niche" (Walker et al 2006: 13). Learning processes, one of the other key aspects of transition management, have occurred between initiatives through for example, site visits and networking activities. This does not mean that more systemic learning processes are in place on an overall more strategic level. Walker et al (2006) have pointed out that the lack of vision and learning mechanisms potentially hinder the impact of community RE initiatives on current mainstream energy system developments.

Whilst reflecting on the strengths and weaknesses of the linkages between programmes, policies and practices to aid diffusion activities through transition and niche management frameworks, Walker et al (2006) have also pointed to potential limitations of the niche theoretical frameworks themselves. These difficulties are grounded in the assumption that initiatives need to have an overriding vision to scale up and replicate, the belief that community energy initiatives either diffuse or cease to exist without considering that they might continue in a niche form, and the inattention that transitions can occur in various different ways (Walker et al 2006). The apparent limitations[44] of these frameworks might not be a reflection on their inappropriateness to examine diffusion processes, but rather

[43] Transitions might not always create large-scale changes to the national energy system. A local transformation for community energy does not need to amount to much for the wider national energy system but impact on mainstream living or the wider local environment. As a team we need to discuss: if the 'transition' might not involve significant change to the national energy system, then what exactly is the 'regime' against/within which Community Energy represents a 'niche'? If niche expansion and innovation diffusion might not involve changing the regime all that much, then we have to ask what the value of a 'transitions' based approach is – especially given that this has developed out of the study of large-scale transformative changes in specific sociotechnical regimes.

[44] See Seyfang et al (2010) and Shove and Walker et al (2007) for a more detailed outline of the limitations. Shove and Walker (2007) have advocated the use of the term 'mode' instead of 'regime' and 'niche' too avoid some of the deficiencies.

based on the under-conceptualisation of certain aspects of this approach. Even one of the key contributors has recognised that the literature on transition management mainly deals with technological rather than social innovations (Seyfang et al 2010).

> "We acknowledge that the role of consumers and grassroots initiatives in transitions is underrated and under-conceptualised, therefore we welcome new perspectives which theorise changes in demand-side practices as motors for transition" (Grin et al 2010: 331).

Seyfang et al (2010) have argued that although the transition and niche management literature does not attend to questions that examine the diffusion of social innovations in particular, and how they expand and take off, it provides some invaluable insights into niche scaling up processes and interactions between the niche and the mainstream. Niches have the potential to influence mainstream systems through creating several impacts when niche initiatives replicate from one place to the other. In addition, initiatives can grow in scale and therefore increasingly affect mainstream systems thanks to supportive niche development processes.

Diffusion processes do not only refer to the replication and scaling up of community energy initiatives but also to adaptation and franchising (The Young Foundation 2006), translation (Smith 2007), expansion, multiplication and mainstreaming (Mulgan et al 2007) and growth and emulation (Houghton 2009) processes. Recent research for Ashden Awards for Sustainable Energy[45] into the replication and scaling up of area-based approaches[46] outlined various diffusion processes under the heading of growth, replication and emulation (Houghton 2009 and CAG Consultants 2010). Growth refers to the potential of an initiative to grow bigger. Initiatives can grow through enrolling a larger number of participating people (such as Dulas Ltd[47]) or broadening the focus on sustainability (such as Ecodyfi[48]).

[45] The Ashden Awards for Sustainable Energy was founded in 2001 to support local sustainable energy solutions. The aim is to encourage the reduction of carbon emissions through energy efficiency measures, behaviour change and renewable energy. These are local energy innovations drawn from local authorities, charities, small businesses and schools. The report examines the potential for increased carbon savings through bringing together local sustainable energy initiatives and integrating sustainable energy solutions in an area.

[46] An area-based approach "takes a small, homogenous, socially cohesive territory, often characterised by common traditions, a local identity, a sense of belonging or common needs and expectations, as the target area for policy implementation" (European Communities 2006). This approach does not only incorporate self-defined community groups but also geographically bound target areas (such as streets, villages and regions). This includes local residents but also local authorities, small businesses, schools and charities. Houghton (2009) provides the following projects as examples of sustainable energy area-based approaches: Warm Zones, Transition Towns and Carbon Rationing Action Groups.

[47] Dulas Ltd is a business that specialises in providing renewable energy services. The company has steadily grown from eight employees to fifty-two since starting up the service. It is owned by its employers and therefore was able to grow without losing its "open democratically controlled organisational structure" (Houghton 2009: 16).

The replication of organisational, legal or financial structures is an alternative possibility for initiatives to scale up. This model requires the initiative to be replicated to be willing to share their experiences, learning processes and expertise. For example, Transition Networks offer a range of resources to communities to enable them to replicate their approach with a high success rate. Such success is based on a commitment to publicise the group's work and help others to set up their own group (Brangwyn and Hopkins 2009). The final diffusion model, emulation, is not concerned with the replication of a particular approach but rather stimulated by a 'big new idea' (Houghton 2009). An example, of a 'big new idea' is the concept of 'One Planet Living'. Houghton (2009) refers to Mulgan et al (2007: 23) to demonstrate the potential for emulation as a way of encouraging more radical transformations,

> "The more a social innovation falls outside the cultural mainstream the more 're-interpretation' will be needed for it to be accepted, and the harder it may be to get traction, or to mobilize effective demand, no matter how effective the supply. Yet when re-interpretation is successful, it achieves impact far beyond the direct impact on any organization."

An example of such 're-interpretation' is an understanding of farmers as being regarded as "guardians of the land" instead of "destroyers of the natural environment" (Houghton 2009: 15).

In addition to outlining numerous diffusion processes, the Ashden Awards report (CAG Consultants 2010) and recent documents produced as part of the Big Green Challenge (Houghton 2010 and Capener 2009) have started to point to the various factors that could potentially encourage such processes.[49] As part of the Big Green Challenge competition[50] community applicants were asked to provide ideas about how their initiatives could be transferred, replicated or grown in the future. The outcome of the report demonstrated

[48] Ecodyfi is a not-for-profit locally controlled third sector organisation that aims to encourage the regeneration of the Dyfi Valley, building on a sustainable community. Nowadays, Ecodyfi's focus is not only on energy but also deals with farming, tourism, waste, transport and local food.

[49] Although an area-based approach is clearly distinct from a community-based one and therefore the models described above might not be applicable for a community energy context, valuable insights might be obtained. Community-based approaches and certain 'enhanced' area-based ones have some similarities and can be potentially combined, as they both require a strong involvement of the local community and a consideration of local and cultural specificities (CAG Consultants 2010).

[50] The Big Green Challenge was a NESTA run competition to promote community-led responses to climate change. It was launched in October 2007. The key objectives of the competition were to increase CO2 reduction, promote innovations (in terms of organisational and management models, strategies to reduce CO2 and involving more local people), enable community engagement and examine the potential for growth, transferability and replication. The winners of the competition developed structures that enable them to grow whilst involving the local community. They have established themselves as community interest companies and co-operatives.

that more than half of the applicants "offered a less well defined strategy for how they would make others aware of their ideas and experience" (Capener 2009: 12). According to Steward et al (2009: 60), a possible explanation to this issue lies in the nature of community approaches such as the common problem of gaining resources whereas other reasons rather acknowledge the overall "highly complex process" of replicating innovations.[51] The former explanation leads to measures to overcome the apparent issues that help to identify 'good practice' approaches or case studies.

In response to this situation Capener (2009) has highlighted the need for external, intermediating support to enable scaling up processes. This would require central government to review the usefulness of current relationships between local authorities, energy suppliers and communities. Such reconsiderations can potentially improve the development of more effective partnerships and the design of key community-led programmes. Research for Ashden Awards into the replication and scaling up of area-based approaches confirms some of Capener's recommendations. In addition to the necessity for external support and partnerships, Houghton (2009: 16) has pointed to the need to increase the number skilled professionals in the low carbon sector, to provide a more open and interactive access to energy supply networks, to diminish various supply chain constraints for sustainable energy technologies, and finally to apply "an open attitude to management"[52] throughout the project development. All these factors have to come together to be able to scale up area-based approaches. Houghton (2009) has argued that it is crucial to allow initiatives to fail[53] and learn from such hurdles in order to be able to develop radical transformations and diffuse more widely. This includes approaches that are community-led and make use of an emulation model (as outlined above).

Capener (2009) and Houghton (2010) are sceptical about attempts that simply try to replicate 'best practice models' from one location to the next, dispersing a "ready made identikit solution" (Houghton 2010: 26). A key advantage claimed for community innovations is that they can be context specific, responding to local needs, resources and aspirations. These specificities might be lost when trying to replicate locally devised innovation into a different area. Such an approach might also limit the potential for innovations to be developed from the bottom up, as 'best practice models' could be

[51] This 'complex' process "depends on there being a well understood model to replicate, confidence that it is worth replicating, communication of the model in the right form to right people, adoption by champions who can promote it to others, implementation in organisations with appropriate capacity and resources, and the ability to sustain itself (Steward et al 2009: 60)

[52] Mulgan et al (2007) further support this argument in terms of the scaling up of social innovations. The diffusion of social innovations often requires for changes to occur that may vary from founders' initial expectations. Social innovations can therefore potentially 'outgrow' founders. In some cases it takes an intermediary actor to take the innovation from niche to the mainstream. According to Mulgan et al (2007) the scaling up of social innovations requires a 'coherent vision' and 'skilful strategy', mixed with the ability to make the most of the available resources and support structures.

[53] As a team we need to discuss: What counts as failure here? Against metrics of success defined by whom?

imposed on the community from elsewhere rather than grounded in local ideas. Innovations that develop from the bottom up often initiate people to feel responsible for devising initiatives and maintaining local ownership. Although a 'one-size-fits-all' model should not be imposed in their entirety onto communities, CAG Consultants (2010) have argued that it might be possible to identify certain successful factors that can be replicated. For example, the Gigha Heritage Trust has developed a financial model for community ownership to develop onshore wind farms[54]. Capener (2009) and Houghton (2010) have therefore advocated enabling initiatives to develop an open and collaborative approach. With such an approach community groups can learn from each other's initiatives and make use of community engagement mechanisms. The replication and scaling up of community-led approaches could be strengthened without losing an involvement of the community and specificities of local innovations. Such insights accord with evidence from firm-based innovation and diffusion literature, where the adoption of technologies or new practices from elsewhere requires innovative local adaptations in order for them to work. In a local energy context, the adoption and adaptation has to be from the bottom-up if they are to retain a sense of being community innovations.

The occurrence of such adaptation and adoption processes caused Shove and Pantzar (2005) to argue that innovations in practice do not diffuse, as implicated in prevailing models of innovation but rather undergo a process of local reinvention. Although the CISE project seeks to understand the diffusion of community energy innovations through the process of replication, scaling up and translation, we do not take these terms and processes from the outset for granted. The project aims to empirically examine to what extent initiatives actually 'diffuse', how these 'dispersion' processes can be described and understood and whether they 'diffuse' in the same way as business innovations (see innovation literature). In addition to innovation and diffusion processes in community energy, the project aims to assess the energy and carbon-reduction performance of energy initiatives. This assessment will enable us to make recommendations and develop scenarios that potentially help this sector to thrive in the future. Some of current debates around measuring the performance of community energy initiatives are briefly discussed in the next section.

Measuring and recognising the performance of community energy initiatives

Methodologies for measuring the performance of community energy initiatives are a subject of debate (see Park's (2011) report on performance measures in community energy for a more detailed review). Walker et al (2007) have pointed to the interrelationship

[54] Another example of a community energy project that can be considered as attempting to scale up is Baywind Ltd. The project set up Energy4All in 2002 to expand their co-op model and field of impact into energy conservation and education.

between ways of evaluating the outcomes of initiatives and coming to a conclusion whether a project is a success or failure. Methods of measuring successes or failures therefore play a significant role in determining the relevance of community energy initiatives in future low carbon energy transitions. CAG Consultants (2010) have supported procedures to develop more standardised methodologies to measure the performance of individual initiatives. Currently some community initiatives spend resources and time on developing their own performance measurement systems but the data collected often cannot be compared across the different community projects[55]. Standardised methods would be able to provide more reliable ways of evaluating the monitoring the different approaches to community-based activities. National and local government and practitioners could discover which approaches are more successful to be able to progress towards their carbon targets. Such measures would not only provide an overall indication of the relevance of community energy initiatives but also sustain the group members' motivation to participate in the activities over longer periods of time (CAG Consultants 2010). The participants of the 'Big Green Challenge' were not necessarily motivated by measuring their performance, as they were increasingly frustrated with the carbon footprint methodologies applied (Houghton 2010). The methodologies did not consider the full range of activities the participants carried out and were therefore regarded as restrictive. The participants could have also benefited from gaining access to monitoring data from energy companies (Houghton 2010).

Debates about the range of activities to be included in methodologies start to touch on the question of which features of a community energy initiative should actually be measured to determine the success of a project. Walker et al (2007: 3) have argued that methods of measuring success should be "sensitive to the diversity of outcomes… and… look beyond immediate carbon reduction". Success can be determined along any number of dimensions (Hoffman and High-Pippert 2009). Some dimensions can be measured reasonably easily in terms of 'drop out rate' amongst participants, exposure of project to the outside world, initiation of dialogue between key actors, electricity and heat generated from renewable sources, reduction of the communities carbon footprint, lifestyle changes, jobs secured and income received from selling generated electricity and heat (Walker et al 2007; Hoffman

[55] The comparison of performance data between projects is challenging because of numerous reasons: projects have different methods of gathering their performance data and measure a variety of different activities (some initiatives do not go beyond measuring the physical aspects of their projects or use combined methods such as ecological footprinting), they can be at different stage of implementing their projects and they all work in a different context (for example number of hard-to-treat homes in the community) (CAG Consultants 2010). For example, ecological footprints can measure 'environmental changes' but not 'behaviour changes'. Methodologies that measure behaviour change are still underdeveloped. Steedman (2006: 7) has suggested that "a broader understanding of behaviour change measurement captures things like capacity, attitudes and knowledge of participants, as part of a process of learning over time". However, a lot of projects consider more 'simple' measures such as number of participants and type of knowledge gained.

and High-Pippert 2009). Other dimensions are much more ambiguous and might be much more difficult to encapsulate. These dimensions are, for example, enhanced social cohesion and community resilience, increased feelings of a sense of belonging and ownership (Hoffman and High-Pippert 2009; Walker et al 2007) and improved levels of behaviour change (Steedman 2006).

CAG Consultants (2010) have advocated the need to convene a study that invites the various actors (such as local practitioners and behaviour change experts) to create standardised methodologies and tools. The methodologies and tools should be able to measure a broad range of community activities in particular simpler ways of measuring changes in behaviour. Such efforts could use the 'Change! Tool' developed by CAG and WWF as a starting point for evaluating community activities (CAG Consultants 2010). The tool is founded on a 'project management approach' that measures the impact community engagement has on behaviour change through calculating 'programme impactors'. It consists of a questionnaire and a variety of different measurements that consider pre and post interventions (for more information about the tool go to: http://www.community-engagement.org.uk/what-is-the-tool.html).

Our literature review (although still in progress) has already highlighted that numerous research projects in the past (such as the Big Green Challenge) and research conducted as part of the ESRC's 'Energy and Communities' call (such as the EVALOC research project) in the near future have attempted to evaluate the performance of community energy initiatives or to examine possible methodologies that aid this process. As part of the Big Green Challenge and the Low Carbon Communities Challenge initiatives have had to measure their own performance either through providing them with 'smart meters or real time display monitors' or 'carbon footprint calculators'. The value of this self-generated data is generally debated. It is widely inaccessible and disclosed to research projects (although DECC is in the process of deliberating whether to make the LCCC performance data available to the ESRC/DECC research projects). As a research team we need to try to gain access to some performance data[56] if made available or gain insights into their methodology, collaborate with other research projects that similarly aim to assess the

[56] Interviewing Phil Downing (DECC) on the 20/01/11, Jin Park has already been successful in gaining some insights into the challenges of producing and accessing community energy performance data. Phil Downing would be willing to share the performance data gathered during DECC's Low Carbon Communities Challenge but still has to gain the permission from his line manager.

performance of community energy initiatives and develop our own methodology (what are the key dimensions when examining innovative activities and their diffusion processes). A methodology that acknowledges their diversity, is sensitive towards the more ambiguous capture dimensions and looks beyond immediate carbon reduction measures such as measures that consider sustainable energy consumption activities. These are discussed in more depth in the next section in relation to community energy.

Community energy initiatives and sustainable energy consumption: Behaviour change, awareness raising and energy conservation

In the UK there are currently only a few community initiatives that concentrate on behaviour change (Steedman 2006). Initiatives aims that focus on the energy demand-side of community energy are often not defined in terms of behaviour change for sustainable consumption but rather relate to "'raising awareness', 'providing opportunities', 'creating new infrastructures', 'providing information' and 'education and training'" (Steedman 2006: 3). According to Steedman (2006: 3) the lack of focus explicitly on behaviour change is partly link to the "unspoken assumptions about consumer behaviour and the factors that affect it". Initiatives still frequently connect the need to provide information with a behaviour change approach. Such an approach often assumes that through providing the 'right' information people will change their attitudes towards the environment and therefore change their behaviours, linking attitudes with behaviours. However, much of the academic literature has argued that such a link frequently does not exist. According to Steedman (2006) initiatives often neglect existing models of behaviour change (probably understandably as they mainly originate from academic discourses). As a result initiatives aim to provide information and raise awareness rather than try to change specific behaviours.

Although initiative often link behaviour change attempts with providing information, recent literature on energy demand-side management has advocated placing more emphasis on community-level activities (Middlemiss 2008). For decades in particular attempts made by policy makers to change energy-related behaviour was aimed at individuals. Individuals have been considered as 'consumers of energy' rather than 'citizens of energy'. These programmes have only had a limited impact on people's behaviours because of their individualistic focus. An individualist focus is grounded in the assumption that individuals are decisions makers who are in full control of their behaviour (Wilhite et al 2000). Nevertheless, research has demonstrated that behaviours are not mainly controlled by

individuals but are shaped by socio-technical infrastructures and conventions (Shove 2003) and often amount to individuals feeling disempowered when being faced with the enormity of the task to tackle, for example, climate change (Thogersen 2005). According to Heiskanen et al (2010) the structure of communities aids the process of reframing the issues associated with individual behaviour change programmes. In community initiatives people work together, empowering each other to influence conventions and shape local infrastructures.

Studying local programmes focused on sustainable behaviour change in Australia, Moloney et al (2010) have similarly argued that community-based approaches are more likely to deal with current socio-technical and institutional constraints that individuals are confronted with when trying to change their behaviours.

> "This is perhaps a reflection of the socially embedded nature of many of these groups, the knowledge of their local communities, the strength of relationships they have built up over time, their role in advocating for local needs and the opportunity they develop in trialling and adapting a range of approaches over time which best suit their local contexts." (Moloney et al 2010: 7622)

Community-based approaches often combine a variety of approaches from providing information, conducting home energy audits with follow-up progress meetings and retrofits to setting up voluntary initiatives[57] and groups that measure their own personal change[58]. Moreover, initiatives share their own knowledge and conduct workshops, community events and serums that sometimes connect religious belief with practical actions or

[57] An example of a network of voluntary initiatives is 'Transition Networks'. Transition Initiatives have been created all over the world. They are groups of people who are keen to develop a community-led response to fossil fuel depletion and climate change. The transition network lists twelve 'ingredients' that make up the 'Transition model' to develop and grow an initiative: 'Set up a steering group', 'Start raising awareness', 'Lay the foundations' – network with other groups, 'Organise a Great Unleashing' – event that creates a memorable milestone', 'Form theme (or special interest) groups', "Use Open Space', 'Develop visible practical manifestations of the project', 'Facilitate the Great Reskilling' – courses such as repairing, cooking and gardening, 'Build a bridge to Local Government', 'Honour the elders', 'Let it go where it wants to go…' and 'Create an Energy Descent Action Plan. A recent project that particularly concerns itself with behaviour change is Transition Town Totnes' 'Transition Streets' that has been funded by the LCCC (Low Carbon Communities Challenge). The project aims to engage the local community in behaviour change (as part of the 'Transition Together' programme), energy efficiency measures, renewable energy and community awareness (for more information see http://www.transitionnetwork.org/ or Lockyer 2010).

[58] An example of such groups is the Carbon Reduction Action Groups network (CRAG). In the UK the Carbon Reduction Action Group network consists of about 21 active groups, 11 groups that are just about to start up and six groups that stopped operating. A CRAG is a group of local people who have an interest in reducing their collective and individual carbon footprint. They therefore come together in regular meetings to set themselves an annual emission target – a carbon ration and track their emission throughout the year through measuring their progress against an agreed carbon allowance. The groups provide constant support and encouragement to their members to help them reduce their carbon footprint. In additions to calculating their individual footprints, groups try to engage the wider community in doing the same by raising awareness, promoting practical actions and providing knowledge and skills (for more information see http://www.carbonrationing.org.uk/).

demonstrate to the public different ways of living (Moloney et al 2010; Steedman 2006). These initiatives can provide on-going support to their community instead of being a short-lived programme that cannot be sustained and address local constraints to behaviour change through locally tailored approaches.

Whilst an increased call for adopting community-based approaches to energy demand-side concerns has been widely advocated by academics, Middlemiss (2008) and Abrahamse (2010) has suggested that there is still a lack of research in the area. Research still needs to rigorously substantiate that community-based initiatives have a positive impact on individual behaviour change. Jackson has also stressed that there is a research gap in this particular area,

> "What is missing from this evidence base, as present, is unequivocal proof that community-based initiatives can achieve the level of behavioural change necessary to meet environmental and social objectives" (2005: 133).

Providing evidence for the success of community-based approaches (and even which approach (listed above) might be most effective) frequently seems to depend on measuring the change generated (Steedman 2006). As outlined in the above section, in particular calculating changes in behaviour is an extremely difficult undertaking. Although the issue of measurability exists, academics, practitioners and policy makers believe that community-based approaches have a role to play in changing people's behaviours. Moloney et al (2010) have proposed that community-based approaches need the support of governments to initiate wider systemic changes. Community-based groups have emerged to compensate for the insufficient response by government to climate change but policy makers should not shift their responsibility away, as they have a key role to play in assisting community-based approaches to change regulatory, institutional and social contexts that impact on people's behaviour. The policy developments over the last decades and the role of potential partners (such as government, local authorities and energy business) are the discussion of the next two sections.[59]

Policy frameworks for community energy, including their development through time

[59] See also CSE and CDX (2007) report produced for Defra on behaviour change through community initiative.

In the late 90s the rhetoric of 'new localism' and 'community' emerged within the UK's energy policy. Although grassroots activists had been initiating community-based energy initiatives for over thirty years, these approaches were relatively unnoticed in energy policies. Such policies consisted mainly of centralised large-scale infrastructure expansions, involving private and public institutions but hardly ever considered community-based approaches. During this time grassroots endeavours to develop alternative energy technologies were informed by the literature on appropriate technology (Dunn 1987), small-scale development (Schumacker 1974) and 'soft energy paths' (Lovins 1977). Activists engaged in community-based initiatives without the assistance of public resources, frequently being overlooked by mainstream energy suppliers. The emergence of community energy in policy in the late 90s initiated a development of governmental programmes and initiatives (alongside NGOs and private sector organisations) that were meant to support community energy initiatives (such as the Community Action for Energy initiative[60]).

Investigating the emergence of such programmes and initiatives, Walker et al (2007) concluded that a range of instrumental policy needs initiated the inclusion of a community-based approach in energy policy. The existence of such varied policy needs demonstrated to Walker et al (2007: 74) that the acknowledgement of this approach was not "a paradigmatic shift in thinking, but rather a fragmented and partial recognition that community approaches had a role to play in 'co-provisioning' alongside established energy generation". Policy makers started to connect activities of 'bottom-up' grassroots initiatives with 'top-down' rural and energy policy needs. Drawing on Hajer's (1995) concept of 'discourse coalitions', Walker et al (2007) have argued that although the actors (such as grassroots activists and policy makers) involved did not necessarily share similar values, meanings and motivations, their difference in opinion was held together by a set of narratives - and in the case of the late 90's sustainable energy policy by the 'community' story line. The structuring of policies through the 'community' story line provided "a discursive space in which opportunities for strategic pursuit of interests" could be enacted (Walker et al 2007: 74), whilst motivations and values could vary and be flexibly interpreted.

"It is often a coming together of interest and actors around a new discourse which can account for shifts towards new policy approaches, languages and ways of thinking – process

[60] Community Action for Energy (CAFÉ) was funded by the Department of Environment, Food and Rural Affairs (DEFRA). Its aim was to work with existing community energy networks to support initiatives networking abilities and community involvement strategies, in particular enabling the work of energy efficiency but also renewable energy projects.

which can be slowburning until opportunities for coalescence emerge around a particular narrative, or set of narratives, of problems and solutions." (Walker et al 2007: 76)

These 'community' story lines were included into different government initiatives and policies, sometimes very explicitly and other times they were more hidden (Walker et al 2007). The story lines were grounded in the actors' assumptions that community energy initiatives are possible solutions for encouraging an expansion of the renewable energy market, diminishing the public opposition of wind farms, enhancing rural regeneration and increasing capital investments (see Walker et al 2007 for a more detailed outline of these factors). These multiplicity of factors relevant for the emergence of community-based approaches in policy meant that various governmental actors and institutions in and outside of energy policy became involved and formed alliances with grassroots initiative (Walker et al 2007). In the late 90s discourses surrounding the benefits of community-based approaches emerged in reports of government and advisory bodies. This included, for example, a report that outlined the application of 'participatory Local Agenda 21 practices' to energy planning produced by the Local Government Association in 1999. In addition, in 2000 the Royal Commission on Environmental Pollution and a guidance document by the Department of Trade and Industry advocated an evaluation of the demand for energy and the use of renewable energy through community-based approaches, highlighting their supposed benefits.

These upcoming community-related discourses established themselves in policy through the inclusion of the word 'community' in numerous sections of the Energy White Paper titled 'Creating a Low Carbon Economy' (2003) and the Planning Policy Statement 22 (2004). The two documents particularly highlighted the potential value of community engagement when trying to gain the community's acceptance of renewable energy projects, indicating that potential conflicts between developers and community members could be reduced. Community involvement processes should make sure that the members are able to present their ideas and feelings about the project at all stages, actively participate in the proposal development and comment on the final version and access all relevant information. Policy makers acknowledged the opportunity for community energy initiatives to have ownership over some forms of energy generation with the possibility to sell excess capacities into the grid. For the first time, the potential role of these technologies to be part of new forms of distributed and local energy generation was recognised.

"There is much more local generation, in part from medium to small local/ community power plant, fuelled by locally grown biomass, from locally generated waste, from local wind sources, or possibly from local wave and tidal generators. These will feed local distributed networks, which can sell excess capacity into the grid." (HMG 2003: 19)

The Energy Review titled 'The energy challenge' (2006) further proposed to examine the possibility of distributed energy as a supplement for a centralised system, including a whole chapter on 'distributed energy'. Smaller-scale systems were regarded as being more flexible and therefore had the potential to reduce network energy losses. In addition to pointing to the prospect of community energy approaches being able to foster the acceptance of the community energy initiatives, the Energy Review (2006) outlined that such these approaches could also engage people in wider energy issues, creating a greater awareness.

"There are many barriers to individual engagement, but we anticipate that local authorities and community groups can play a key facilitating role. Research… has shown that engagement at a local and community level is important. This is because attitudes to climate change are more likely to be changed through individual interaction and because climate change messages need to have local relevance to appeal to people." (HMG 2006: 52)

Policy makers were keen to include a community-based approach to raise the awareness about energy related issues and to encourage local authorities to be part of this process. During this time it was not only the effectiveness of community-based approaches to raise awareness that was acknowledged by policy makers but also their potential to bring about behaviour change. The UK Government's Sustainable Development Strategy titled 'Securing the Future' (HMG, 2005) includes a section on 'Community Action 2020 – Together We can' that pinpoints to various ways in which voluntary, enterprises and community organisations can bring about behaviour change more effectively than current strategies. Seyfang and Smith (2006) have argued that Sustainable Development Strategy demonstrates an increased policy attention on the social economy to deliver transformations towards sustainability. The Sustainable Development Strategy (2005) and the Energy Review (2006), followed by the Energy White Paper (2007) and Energy Act (2008) seemed to have represented an apparent step towards considering and supporting community-based

approaches since the Energy White Paper in 2003. The restatement of the significance of community energy initiatives was the content of various policy documents, in addition to energy, such as the Microgeneration Strategy (2006), Sustainable Energy Act (2004), Communities and Local Government Planning Act (2008) and Climate Change Act (2008).

During the period of 2000-2006 governmental departments and agencies did not only produce policy statements but also established various energy programmes and initiatives that corresponded with the policy documents. One of the first initiatives was 'Community Action for Energy' in 2001 followed by the 'Community Renewables Initiatives'[61], 'Community Energy'[62]. 'Renewable Obligation'[63], 'Scottish Community and Households Renewables Initiative'[64] and the Energy Saving Trust's 'Photovoltaics Programme' in 2002, the 'Renewable Guarantees of Origin' and 'Clear Skies'[65] in 2003 and finally the 'Carbon Emission Reduction Target'[66] and NESTA's launch of the 'Big Green Challenge' in 2007. Although policies were still mainly designed to sustain large-scale renewable projects (Hain et al 2005) and funding and support programmes often were short-term and small (Walker et al 2007), these initiatives and programmes were meant to support, provide funding and promote community energy initiatives. Walker et al (2007) have pointed out that the governmental steps towards supporting community energy initiatives had two distinct features. Firstly, the emergence of these programmes was not part of an overall governmental plan, as different governmental agencies and departments were often initiated independently of each other without any correspondence. Secondly, initiatives were entrusted to direct their own actions without central or regional governmental

[61] The Community Renewable Initiative (CRI) was set up but the Countryside Agency in 2002. The initiative was funded by the Department of Trade and Industry (DTI). One of its key aims is to "help groups and individuals realise the renewable energy can form part of the regeneration of their locality" with the intention that through the work of the initiative "over the next few years, local communities… will be supported to propose, plan for, seek funding for, develop, own and take energy from renewable energy projects" (?).

[62] Community Energy, started in 2001, provided grants to support community heating schemes in the public sector across the UK. It was managed by EST and the Carbon Trust. EST is funded primarily by DTI and Defra.

[63] Renewable Obligation (RO) is a UK based support scheme for renewable energy projects. The scheme commits energy suppliers to source a part of their electricity from renewable energy sources.

[64] Scottish Community and Households Renewables Initiative is a 'one-stop shop' offering grants and project support to assist the development of community renewable schemes in Scotland. It is funded by the Scottish Executive and managed jointly by the Energy Saving Trust (EST) and Highlands and Islands Enterprise (HIE).

[65] Clear Skies was a programme that provided grants for a number of technologies to communities and homeowners. It has been replaced by the Microgeneration Certification Scheme which is an industry led and funded scheme.

[66] Under CERT, energy suppliers must deliver measures that will provide CO2 savings that amounts to an equivalent of the emissions from 700,000 homes each year. As part of this, energy suppliers must focus 40 per cent of their activity on vulnerable and low-income households.

direction, which was "redolent of the "neo-communitarian" discourse and practice of devolving responsibility to communities with "self-governance" capabilities" (2007: 71).

As a result of the expanding national funding and support programs and their non-strategic and neo-communitarian features, the diversity of actors involved in community energy expanded, community energy initiatives had a supported space to experiment with different ownership and organisational models and the number of community energy initiatives increased significantly, although this increase in numbers needs to be considered with caution. Walker et al (2007) have argued that it was not possible to verify whether all of the initiatives were able to materialise a project. Initiatives frequently had high ambitions at the beginning of setting up a project but sometimes failed to produce any outcomes. Some of the other initiatives 'stretched' the community label outlined in the 2003 Energy White paper, as they could not be regarded as open, participatory or trying to gain collective benefits. Even though the increase of numbers needs to be considered with caution, Walker et al (2007) have concluded that through this development community energy initiatives and their local actions were able to partner up with organisation engaged at a national level to create working relationships that were highly networked and inclusive.

Since the late 90s the interest in community energy initiatives, such as making a case for a community energy policy, started to grow. The period of 2009 and 2010 has been shaped by an increase of governmental support for community energy, introducing numerous new governmental programmes, some of which replaced old schemes and the election of a coalition government in May 2010. In July 2009 the previous government published the 'UK Low Carbon Transition Plan'[67] along with the 'UK Renewable Energy Strategy', making a clear statement towards the government's inclination to actively support community energy initiatives.

"Helping communities to take action is an integral part of the Government's strategy." (HMG 2009)

The Low Carbon Transition Plan outlined how the UK might be able to achieve the target of cutting 1990 CO_2 emissions levels by 80% for 2050. The paper highlighted that it is a

[67] The White Paper details a strategy to cut UK emissions by 80% by 2010 and by 34% by 2020. One of the key strategies is to reduce the emission from homes to near to zero in 2050 through energy efficiency and low carbon energy measures.

combination of "dynamic, competitive markets, a strategic role for Government, and active communities" that will lead to a low carbon future.

Instead of largely outlining the potentials of community-based approaches, both policy documents summarised measures to support community energy initiatives, many of which had been identified in previous policy documents. These measures cover the development of a smart grid, new funding strategies, licensing arrangements, performance indicators and an 'How to guide' for community energy and a more significant role for local authority to work in partnership with initiatives (Houghton 2010). These measures do not only outline the relevance of community energy initiatives in policy but also change in approach (Houghton 2010). For example, local authorities and community groups are encouraged to work in partnership to not only address carbon and energy related issues but also wider policy needs, such as well-being, the creation of green jobs and development of new sustainable housing. In particular the 'Low Carbon Transition Plan' reinforced that community initiatives should be able to depend on their local authority "to co-ordinate, tailor and drive the development of low-carbon economy in their area" (2009: 94).[68] Grant programmes, including the requirement to pay upfront for energy efficiency measures and microgeneration technologies, have been replaced by 'clean energy cash back' (such as FiT) and 'pay as you save' (such as PAYS in Birmingham) schemes (HMG 2009) to financially support energy-efficiency and renewable energy initiatives.

The introduction of a 'Feed in Tariff' (FiT)[69] and the 'Renewable Heat Incentive' (RHI)[70] in April 2010 was verified in the UK Low Carbon Transition Plan and the UK Renewable Energy

[68] The growing role of local governments to support community activity has been communicated through a variety of policy statements (Peters et al 2010). Investigating this increased role of local authorities, Peters et al have listed the following key statements in their paper, "This includes the Local Government Act, 2000, which places new emphasis on the importance of developing community strategies; the Local Government White Paper, 2006, 'Strong and Prosperous Communities' (CLG, 2006), which details the scientific evidence for the threat of climate change, The Climate Change Programme, 2006, in which local authority action on climate change is prioritized (HM Government, 2006); and the 2007 Energy White Paper (DTI, 2007), which identifies a key role in informing households of the links between actions, especially in relation to energy efficiency, climate change, and in promoting lifestyle changes" (2010: 7597).

[69] Feed-In Tariffs (FiTs) is a 'Clean Energy Cashback' scheme. Under this scheme energy suppliers have to make regular payments to householders and communities who generate their own electricity from renewable or low carbon sources. The tariffs have been introduced by the Government to help increase the level of renewable energy in the UK. Although initially the coalition government agreed to not review the FiT until 2012, the Energy Secretary Chris Huhne has launched a comprehensive review of the scheme on the 7th of February 2011. It is expected that the review will conclude at the end of 2011. However, two issues will be fast-tracked: the consideration of solar projects over 50kW and the take-up of farm based Anaerobic Digestion plants. The reason for this review is based on the government's concern that the scheme is being used for large-scale solar farms rather than for community projects. These

Strategy. Both schemes are meant to incentivise small-scale low carbon energy generation. In the case of FiT, the 'clean energy cash back' scheme makes it possible for community groups to invest in low carbon energy generation, whilst receiving a guaranteed payment for the electricity produced for up to 25 years. In addition to the Fit and RHI, during the period of 2009-2010 the previous government introduced not only schemes that support low carbon energy generation but also energy efficiency measures, such as the 'Community Energy Saving programme' (CESP)[71], the 'Low Carbon Communities Challenge' (LCCC)[72] and an extension of the Carbon Emission Reduction Target (CERT). CESP tries to deliver energy efficiency measures to low-income households in the UK from 2009 until 2012. CERT is a bigger programme than CESP and has been running for a longer period of time (since 2002). It is currently coming into its third phase. As part of this phase, the programme obligates energy suppliers to reduce the domestic sector's carbon emissions. New schemes, such as 'Warm Front' and 'Decent Homes' that aim to improve the energy efficiency of homes have taken an area-based approach, whilst trying to develop partnerships between local authority, energy companies and community groups to deliver these programmes.

Even under the coalition government schemes, such as Fit, RHI, CESP and CERT, will remain to play a part in the government's efforts to develop a low carbon future. Although the details of the Energy Bill 2010/2011[73] are still being discussed at the time of writing, a press release in October 2010 has already indicated the future of FiT,

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changes to the scheme might have some damaging implications for community-based cooperatives that make use of solar technologies.

[70] The Renewable Heat Incentive (RHI) is very similar to the Feed-In Tariff a comparable scheme for electricity. In June 2011 the Renewable Heat Incentive will come into force.

[71] The Community Energy Saving Programme (CESP) has been created as part of the 'Home Energy Savings Programme'. The programme aims to introduce energy efficiency measures so that low-income homes permanently are able to reduce their energy bill, making use of a 'whole house approach'. The delivery of the programme is based on a community-based partnership between local authorities, energy generators and suppliers and the funding is provided through an obligation on energy suppliers.

[72] The Low Carbon Communities Challenge (LCCC) is a two years programme set up by the previous government to provide financial support and advice to 20 community initiatives that try to tackle the introduction of energy efficiency measures and wider issues of climate change across Wales, Northern Island and England. The programme aims to develop an understanding of the potential role of community initiatives in the transition to a low carbon future and models for community actions that inspire others to initiate their own projects.

[73] The Energy Bill 2010/2011 has been published in parliament on the 8th of December 2010 and is due to be read for a 2nd time on the 22nd of December 2010. Currently, a summary document that provides a brief overview of the Energy Bill (2010), a press release (Dec 2010) and the Green Deal summary proposal (2010) provide some indication of the content of the Energy Bill that is being composed by the coalition government.

"Feed-in Tariffs are here to stay and we confirmed last week that we don't want to change the tariffs until 2013 to ensure ongoing investment in new projects." (Climate Change Minister Greg Barker 2010)

The coalition government has also committed to replacing CERT and CESP when they expire in 2012 with the 'Energy Company Obligation' (ECO) and to 'Green Deal' as part of the Energy Bill 2010/2011. ECO will oblige energy companies to assist people living in properties that do not easily allow the application of energy efficiency measures, the most vulnerable and poorest households with the insulation and improvement of their heating systems. The Energy Bill includes a specification of a new 'Green Deal'[74] that is meant to transform the energy efficiency of British homes (HMG 2010). The proposal would allow local authorities, community groups, charities, social enterprises but also energy companies to finance and deliver energy efficiency improvements under the Green Deal (CAG 2010). These improvements are meant to be available to everyone with no upfront costs. The work will be paid back from the savings people make on their energy bill.

Allcorn (PRESENTATION) has pointed out that the coalition government "indicated a will to accelerate activity, rather than a radical change of course", such as the will to keep supporting various schemes set up by the previous government (as outlined above). The Annual Energy Statement in July 2010 similarly indicated that community involvement to develop renewable energy and local low carbon project still plays a part in current energy policy developments. The coalition government promises to support in particular community-owned renewable energy initiatives that try to benefit the local economy and distribute some of the energy produced to the local community (HMG 2010). Although at the time of writing, coalition government plans are still being developed, the possible inclusion of community involvement in energy policy is further apparent in the recently uploaded online portal, DECC's Community Energy Online. The portal is meant to increase the awareness and provide a comprehensive guide on how to deliver and design renewable energy and local low carbon projects. The guide emphasises the requirement to integrate approach that combines energy efficiency measures and local low carbon and renewable solutions.

[74] The Green Deal is due to start in autumn 2012.

Policy-makers seem to take into account community-based projects when examining the opportunities of decentralised energy. Even though, when considering the recent launch of a comprehensive review of the FiT scheme on the 7th of February 2011 by Energy Secretary Chris Huhne, it becomes apparent that community groups might have to adapt their initiatives or even discard their long efforts to set up a renewable energy source. It is expected that the review will conclude at the end of 2011. However, two issues will be fast-tracked: the consideration of solar projects over 50kW and the take-up of farm based Anaerobic Digestion plants. The rationale for this review derives from the government's concern that the scheme is being used for large-scale solar farms rather than for community projects. The changes to the scheme might have some lasting implications for community-based cooperatives that make use of large-scale solar farms. The role of community energy groups within national energy policy will further emerge once the Energy Bill 2010/2011 is published.

Role of actors: local authorities and energy business in supporting community energy

Over the last years the UK government has suggested that community energy initiatives are not meant to act by themselves but rather work in partnership with local authorities and energy companies.[75] Energy companies have played a part in developing area-based approaches, mainly through providing finance and support (Houghton 2009). The contribution of these companies can be based on technical but also marketing advice. Houghton (2009) has acknowledged that such advice often is linked with having less community involvement in the project. Both the White Paper 'Meeting the Energy Challenge' (2007) and 'UK Low Carbon Transition Plan' have emphasised the significant role of local authorities in supporting community groups[76] and developing their own local approaches to act on climate change (Peters 2010). The UK government is keen to "unlock greater action by local authorities in identifying the best potential for low carbon community-scale solutions in their area" (HMG 2009: 79). Community groups should be able to trust in their local authority "to co-ordinate, tailor and drive the development of low carbon economy in their area" (2009: 94).

[75] More information on the role of NGO's and other intermediary actors can be found in Houghton (2009).

[76] Local authorities can be in charge of initiatives, work in partnership with community groups (for example in some of the area-based approaches and even sometimes in consultation with some energy companies), can use their role to help groups network and provide funding and advice.

The recent support of local authorities seems to be based on the Conservative's plans to create a 'Big Society'. The plans involve a decentralisation of power to communities, individuals and local authorities, providing local authorities with greater decision-making power and financial autonomy (CAG Consultants 2010). Local authorities would have a greater responsibility and strategic role to play whilst acting on behalf and for local communities and individuals, both in relation to aiming to reach national level objectives such as reducing carbon emissions and in terms of meeting the needs of the local community. The Low Carbon Communities Network (2010) has outlined that such a development would bring certain challenges and opportunities to the community energy sector. For example, the attempt of the government to ensure that local groups provide certain services corresponds with the aims of numerous community groups. However, the delivery of such services might create a competitive environment between these groups and larger competitors in which they would need to have a strong support structure in order to succeed.

Numerous local authorities[77] have taken this role of driving forward programmes that are meant to engage the community with issues surrounding climate change but these authorities are an "'exception' rather than the 'norm'" (Peters 2010: 22). They are currently various barriers that prevent local authorities from playing a more active role (see Peters (2010) and CAG Consultants (2010) for a more detailed outline of these opportunities and barriers). They have, for example, a lack of resources and skills to support community groups. Roberts (2010: 85) has argued that there is "now a need to understand better how to secure the necessary improvements by local authority in their performance in this role so that good practice becomes that norm rather than the exception".

Conclusions

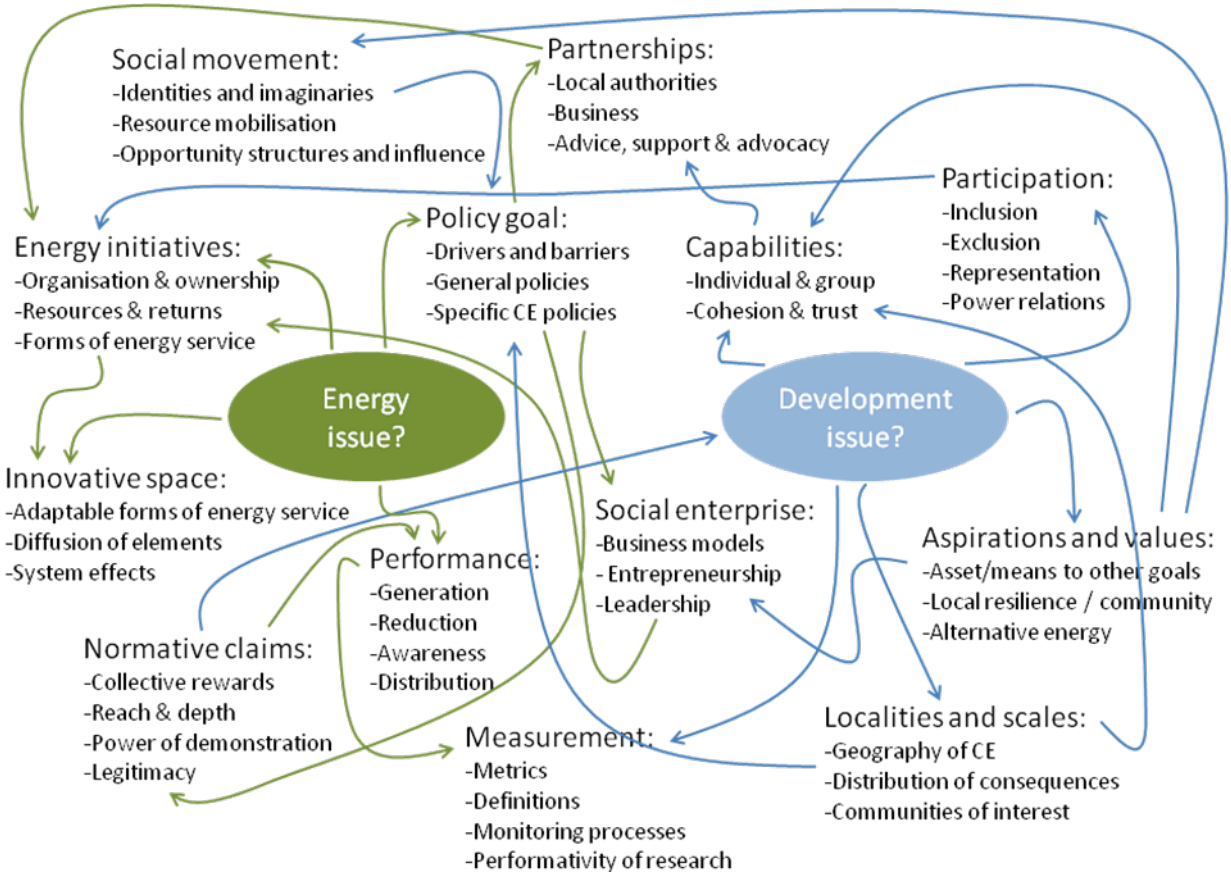
Reviewing the literature on community energy soon makes clear how diverse is both the field of study and its analysis. There is no unequivocal definition of community energy, nor are there a clearly delineated set of theories of community energy. Whilst groups of people have been pursuing community energy initiatives for decades, it is only in recent years that this activity has been resurgent and salient in the eyes of policy and research. As such, dialogue between different research insights and the forming of an overall picture is still in

[77] Local authorities that have taken an active approach are, for example, Shropshire County Council, the London Borough of Richmond-upon-Thames Council and the London Borough of Islington Council (Peters 2010).

its infancy. However, the diversity, dynamics and context sensitivity of community energy suggests any comprehensive theory or picture of the field will remain elusive. Rather, what is available is a rich body of work that is of more or less relevance depending upon ones research and practical interests in community energy over time. In our case, we have related the literature to our concern for sustainable energy innovation in community group settings.

An important feature in the literature is the movement between conceiving of community energy as an energy issue, and conceiving of it as an issue in community development. Conceived as an energy issue, then analytical certain themes come to the fore, such as: the governance of local initiatives, the kinds of energy service they create, their performance (usually in terms of energy), the measurement of that performance, policy goals towards community energy, and the influence of broader energy policy agendas. Many of these analytical themes are interrelated. This is illustrated in the Figure below, which lists and tries to link some of the themes identified in our review.

Figure: analytical themes in the community energy research literature



Also in the Figure is community energy conceived as an issue in community development. Here questions of the capabilities required and developed become significance, as do issues about participation, representation and exclusion. The features of the localities in which initiatives take root, and the scale over which they operate, depend upon other features of the communities involved. A community development orientation also reminds us about the centrality of the aspirations of the people behind the initiative, and whether they see their activities as part of a process of innovating sustainable energy future, or simply an opportunity to refurbish a local community centre in a way that generates revenues for other activities.

What makes community energy so interesting from an innovation perspective is that it reminds us that developing sustainable energy is inextricably tied up with questions of social development (and social justice). Whilst questions of participation in the processes and outcomes of energy developments seem more immediate at the community scale (including spatially dispersed communities of interest), they are nevertheless pertinent to energy innovation in all settings. The review here has certainly helped the CISE project better understand the space that community initiative provides for innovations in sustainable energy, and which we will explore further in our research.

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